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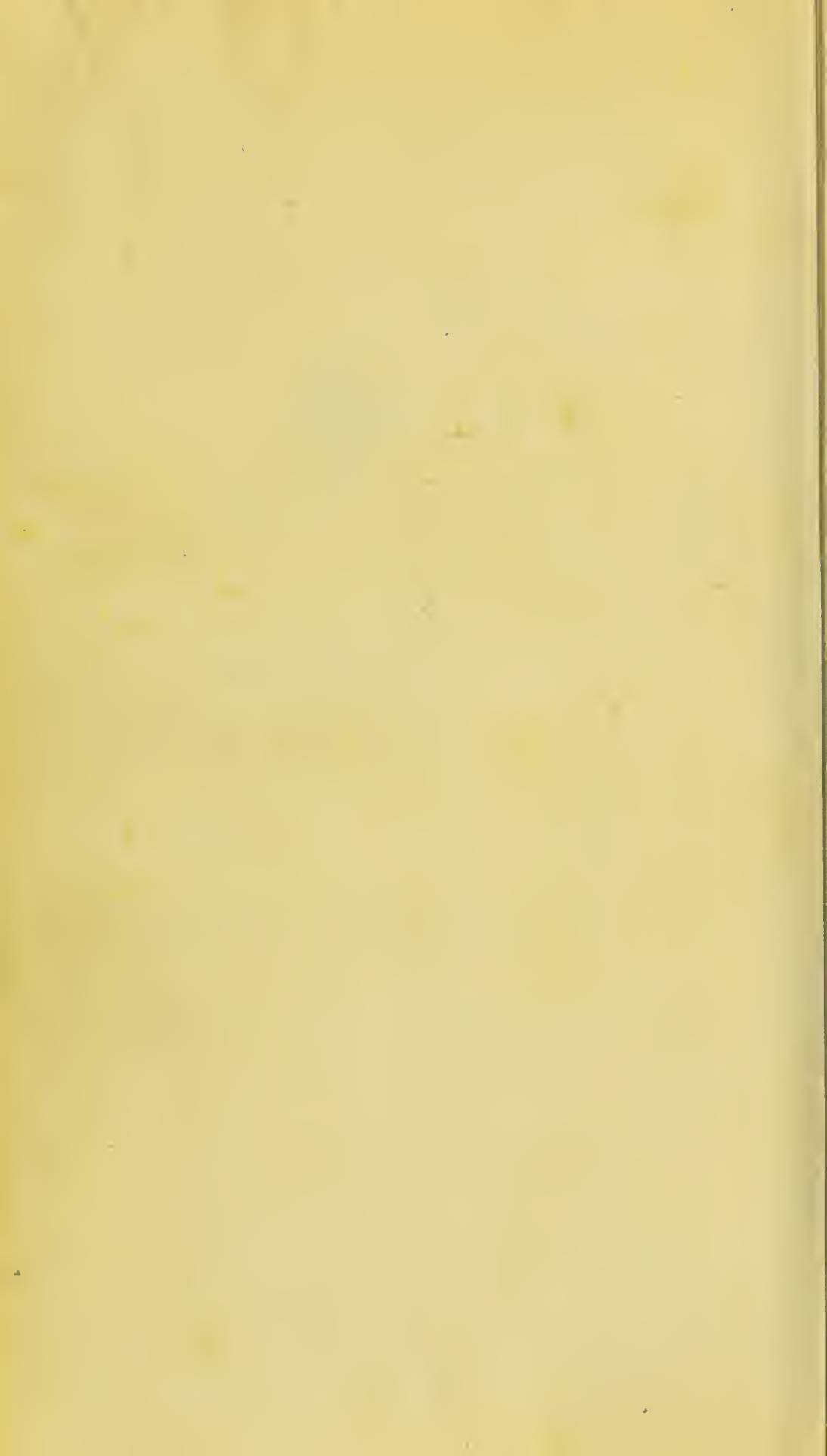
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# OBSERVATIONS

ON THE

DISEASES

OF

SEAMEN,

BY

GILBERT BLANE, M.D.

F.R.S.S. LOND. AND EDIN.

PHYSICIAN EXTRAORDINARY TO THE PRINCE AND PRINCESS  
OF WALES,

PHYSICIAN TO THE DUKE OF CLARENCE,  
AND ONE OF THE COMMISSIONERS OF SICK AND WOUNDED  
SEAMEN.

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THE THIRD EDITION,

WITH CORRECTIONS AND ADDITIONS.

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1799.

BRISTOL ROYAL INFIRMARY.

Nec Medici, nec Imperatores, nec Oratores, quamvis  
artis praecepta perceperint, quidquam magna laude  
dignum sine usu et exercitatione consequi possunt.

CICERO.



TO  
HIS ROYAL HIGHNESS  
THE DUKE OF CLARENCE  
AND ST. ANDREW'S;  
*ADMIRAL, &c. &c. &c.*

THE following Work is the fruit of several years labour employed in the Public Service, chiefly under that great and successful Admiral, Lord Rodney, in a series of Naval Operations, which have been productive of events more glorious than any before recorded in the Annals of Britain. As your Royal Highness was present dur-

ing

## DEDICATION.

ing some part of the service which is the subject of these Observations, and as You have not only honoured the Sea Service by embracing it as a profession, and enrolling your illustrious Name among its officers, but in undergoing the dangers and fatigues of actual service, which is so necessary to attain that practical Skill which Your Royal Highness is well known to possess, I presume, upon these grounds, humbly to request Your countenance to this Work. I should do this with greater satisfaction, were it more worthy of Your patronage; but however inadequate my abilities may have been to the task, it has been my sincere aim to produce a work of some utility to that only Bulwark of our Country, the British Navy, of which your Royal Highness is the Pride and the Hope.

This

## DEDICATION.

This Work is also inscribed to Your Royal Highness with the greater propriety, that it is not intended merely for those of the medical profession, but calculated for the use of commanders, upon whom chiefly the prevention of sickness depends; and Your Royal Highness has been pleased to inculcate by Your example, that this part of the naval service, as it is highly interesting in point of humanity as well as policy, so is it an object of indispensable duty in commanding officers, and not unbecoming the dignity of the most exalted rank.

Your Royal Highness's Permission to inscribe this work to You, and the personal Notice and Protection with which You have been pleased to honour me, I consider as the first Distinctions of my life, and of which I



DEDICATION.

hope ever to entertain a becoming  
sense, by cherishing those indelible  
sentiments of Respect, Gratitude, and  
Attachment, which are due to Your  
Royal Highness from

Your Royal Highness's

Most faithful,

Most obedient, and

Most devoted Servant,

GILBERT BLANE.

## P R E F A C E.

HAVING been appointed Physician to the Fleet under the command of Lord RODNEY, in the beginning of the year 1780, I determined to avail myself, to the utmost of my abilities, of the advantages which this field of observation afforded. This I was led to do, in order to satisfy my own mind as a matter of duty, as well as to find out, if possible, the means of bettering the condition of a class of Men, who are the great Safeguard of the State, but whose lot is hardship and disease, above that of all others.

A Fleet, consisting seldom of less than twenty ships of the line of battle, and sometimes exceeding forty, which I attended in the different scenes of active service in that distant and unhealthy region, for more than three years, has afforded me opportunities of making observations upon a large scale.

My object has been prevention as much as cure ; and as the former must more particu-

larly depend on a knowledge of the external causes of disease, I have collected and arranged all the facts upon this subject that came within my reach, considering these as the only grounds from whence the remote causes of health and sickness could be deduced.

When I entered upon my employment, the Commander in Chief gave an order, that every surgeon in the fleet should send me a monthly return, stating the degree of prevalence of different diseases, the mortality, and whatever else related to the health of the respective ships. This was done with a view to enable me to regulate the reception of men into hospitals, so that each ship might have a due proportion of relief, according to the degree of sickness on board, taking care at the same time that the hospitals should not be overcrowded; and also to acquaint the Commander in Chief, from time to time, of the state of sickness, or the predominance of particular diseases, in order to recommend such articles of diet, or other means, as might tend to cure them, or to check their progress. These returns have served also in this work as a method of collecting a multitude of well-established facts, tending to ascertain the causes and course of disease.

I feel

I feel greatly indebted to the surgeons for the punctuality and exactness with which they furnished these returns, and I ought not to suffer any opportunity to escape of expressing my value for this class of officers. They are perhaps more regarded in our service than in that of other nations, but it would be for the public benefit if they were still more respected and encouraged. To men of liberal education and sentiments, as surgeons ought to be and generally are, the most effectual inducements for them to enter into the service, and to do their duty when there, are flattering attentions, and a certain degree of estimation in the eyes of other officers. This in its operation on liberal minds would, to a certain length, stand in place of pecuniary emolument. It is what may be called, in the words of a late eloquent writer\*, "The cheap defence of nations." Liberality of manners on the part of superiors, is at the same time a more likely means of ensuring a conscientious performance of duty in this profession, than strict and distant behaviour, which may indeed operate on the minds of those whose functions are merely mechanical, but how can it infuse that tender attention to human sufferings, and that sense of duty which may induce a man, entrusted

\* Mr. Burke's Reflections on the French Revolution.



with the health and lives of his fellow-creatures, to act his part with propriety and effect?

While the fleet was in port, I also superintended and visited daily the hospitals, of which there is one at almost every island on the station; and having kept an account of the different kinds of disease that were admitted, and of their mortality, I have in this way likewise been furnished with a number of facts that may throw light on the history of human maladies, and lead to their prevention and cure.

It behoves every one who engages in a profession so important, and at the same time so full of ambiguity as that of medicine, to discipline his mind properly with regard to the laws of evidence, and the rules of investigation, so as to draw fair inferences from facts, to avoid credulity on the one hand, and scepticism on the other, both of which are equally unfriendly to the discovery and application of practical truths. It will not therefore be out of place here to submit to the reader the principles which have guided me on this subject.

Practical skill in every art consists, I apprehend, in adapting means to ends, and must therefore be founded on the knowledge of the  
energies

energies of natural agents as they reciprocally affect each other, and it is the business of observation and experience to ascertain and select the facts constituting this knowledge\*.

In those enquiries which have inanimate matter for their subject, a single fact may be a sufficient ground for an observation, but in those which relate to the living body, there are several circumstances which give occasion to ambiguity, and render the discovery of practical truths more difficult.

The first I shall mention is, that there are resources in nature whereby diseases are subdued without any interposition of art, as is evident with regard to wounds, and even acute diseases, not only in animals but in the human species, and that therefore the operations of nature and of art come to be so blended, that it is difficult to distinguish them so as to ascertain what is due to each. It is well observed by some medical writer, that the animal frame differs from all other machines in this, that when out of order it can rectify itself. This holds with regard to prevention as well as cure; for infection, not excepting that of

\* See this farther elucidated at page 39 of a Lecture on Muscular Motion, read before the Royal Society of London the 13th and 20th of Nov. 1788, by Gilbert Blane, M. D.

the plague, will frequently disappear spontaneously. It is not meant by this to detract from the efficacy or utility of the art of physic; for allowing it to be true in its full extent, it still becomes a question, in the eye of reason, how to regulate nature, with regard to her external agents, such as heat, cold, and diet; and it becomes the business of art to interpret her intentions with regard to them. And when we reflect that the diseases and casualties of the human species are multiplied and aggravated by the artificial modes of life dependent on our reason, it is presumable that these must be opposed by artificial means of relief suggested also by reason. But it is not merely presumable but certain, as a matter of fact, that most diseases are more or less under the controul of art; and one could be named which, being absolutely irresistible by the powers of nature, would go far towards the extinction of our species, were it not resistable by the powers of medicine.

The next peculiar source of difficulty alluded to, consists in the diversity of the constitution of individuals, depending on natural *stamina*, and other circumstances, such as age, sex, and habits of life, in consequence of which it becomes necessary to vary practice in the same disease by a nice exercise of discriminative.

minative judgment, and to be cautious in drawing general conclusions from single facts.

The third circumstance of this kind which I shall mention is, that the living human body, while it is acted upon by all the causes which affect inanimate matter, is also subject not only to those affections which are incident to animal nature in general, but to those depending on the operations and passions of the mind connected with rationality. It is evident, that where a cause is simple there is little difficulty in ascertaining it, and applying it to a practical purpose; but when an effect is the result of many causes, as is here the case, it becomes impossible to embrace and calculate them all, so as either to predict or command any event depending on their joint action, without the utmost risque of error; and this is so much the case with regard to diseases, that it seems most adviseable to lay aside, in a great measure, the consideration of internal and latent causes derived from refined speculations, and to be guided in practice by a few obvious principles, and by the sensible effects, produced by external agents whose powers are ascertained by observation and experience.

Fourthly, The great obscurity of the causes of most diseases, and the difficulty of investigating



ing the principles of the animal œconomy. It may be safely affirmed, that these are still so imperfectly known, as to admit of little practical application. The theoretical doctrines of physics have generally no better foundation than hypothesis, and have taken their colour from the prevailing philosophy of the times. The principles of mechanics, hydraulics, and chemistry, have at different periods been so plausibly applied to explain the functions of life, and the operations of medicines, as to gain the general assent of the times. Though juster views of the animal œconomy have caused these pretty universally to be exploded in this age, yet the experience of past errors has not prevented our contemporaries from yielding to the fascinating novelty of a new branch of philosophy, called the pneumatic chemistry. This has been so successfully cultivated of late, as to do honour to the present age, by its important discoveries in the habitudes of several species of inanimate matter. Nor can it be denied, that it has been ingeniously applied to explain some of the *phænomena* of life; but this must necessarily be partial and limited, in as much as life is regulated by laws of its own, and in so far as relates to practical inferences, the application of the new chemistry seems equally fanciful, puerile, and fallacious, as that of the mechanical and chemical principles of the older schools.

Theoretical enquiries into animal nature, have in our times indeed been conducted by some authors upon principles of greater philosophical precision, by considering it as subject to laws peculiar to itself. But it yet remains to be proved, what substantial practical advantage has resulted from these speculations.

The reason why physiology has not been applied with more success to practice, is not only because the greater part of the reasonings are hypothetical, and therefore uncertain and fallacious, but because it is necessary for this end, that this sort of knowledge should be perfect in every branch of the animal œconomy. It is not enough that we can ascertain one or more points, for there are so many bearings, and mutual dependencies in the functions of the human frame, that if we are to act upon our knowledge of them *a priori*, a perfect knowledge of them all is necessary, with a view to any efficient practical purpose, as they may all have more or less share in any given effect intended to be produced. To neglect the consideration of any one of them, in the measures to be adopted, would prove a source of error, similar to the omission of one of the elements in a calculation, and would in like manner

manner produce an erroneous result. The circulation of the blood, which is one of the few discoveries in the animal œconomy, that has been incontrovertibly established, has not been of so much practical utility as might be supposed; the reason of which is evident from the foregoing considerations; for it is not the mere mechanism of our frame that determines its operations, but also the energies depending on sensibility, irritability, and the affections and operations of the mind.

If theory could be rendered perfect, there can be no doubt of its utility, in as much as our knowledge of nature extends our power over nature. But it is highly improbable that in a system so dark and complicated as the living human frame, it will ever arrive at this perfection, and from its present crude state, and from the eagerness of the human mind to pry into causes, and to make a hasty application of science to practice, what is called physiology and pathology are extremely liable to abuse, and this abuse has been one of the principal means of corrupting practical medicine and retarding its progress. It is but fair however to acknowledge that studies of this kind have their use, for in common with natural knowledge in general they serve to enlighten the mind by banishing superstition

tion and credulity; and though practical truths can rarely be deduced from them, yet theory, even though false, tends to suggest new remedies and methods of cure, and to confirm or vary those which are already in use; in this way ministering to experience, without the sanction of which these suggestions are deserving of no regard \*. It is remarkable that Boerhaave, upon fanciful principles, discovered several useful facts.

As we have so little to expect, therefore, from theory, and as it has appeared that animal life is influenced by so many circumstances affecting the result of experiments, and giving rise to contingent events, a great number of facts, duly varied and compared, must be necessary, in order to produce those legitimate deductions properly constituting *observations*. An observation is, as it were, a general fact, deduced from the average of a number of individual facts, and in the art of physic most observations are the results of in-

\* See this question treated fully and accurately, and in the most impartial and dispassionate manner, by Cornelius Celsus (an Author who lived in the time of Tiberius Cæsar) in his Preface, a composition which can never be enough admired for its good sense as well as elegance.



ductions more elaborate and difficult than perhaps in any other branch of art or science. In order to attain them, there is required not only patient attention to collect, and memory to retain, but that rapid intuitive glance of the mind called sagacity, to compare and discriminate them in the moment of application. This faculty is a sort of higher instinct, instituting an instantaneous and tacit calculation; and it is by attempting an imitation of this process of the mind, that I have endeavoured to frame the method of investigation pursued in this work.

The last impediment I shall mention, to the progress of medical truth, is the great difficulty of appreciating testimony. We have not only to guard against our own credulity and self-deception, but those of others. In consequence of medical practitioners not accurately distinguishing between the operations of nature and of art, drawing inferences from individual cases, and being biased by favourite theories, not to mention the allurements of vanity and self-interest, which it is to be hoped seldom influence the regular members of the profession, it is a melancholy truth, that there is perhaps no branch of human knowledge in which there is so great  
a want

a want of correctness with regard to recorded facts.

The whole subject of medical investigation and evidence, being of the utmost consequence, would require a more full discussion; but it has here already exceeded the usual bounds of a preliminary discourse. Enough, however, has been said to convince every person of a correct judgment, how difficult it is to ascertain truths, and to draw fair and solid inferences, on medical subjects.

I have attempted, in the following work, little more than to amass, from my own observation, and by the assistance of the surgeons of the fleet, a number of well-established facts, and to arrange them in such a methodical manner, as to prove a groundwork for investigation; and I am persuaded that others may be able to deduce from them observations that may have escaped me, especially if these new, but imperfect, attempts, should come to be compared with similar ones that may be made by other observers in other climates, and in other circumstances of service.

It is evident, from the considerations that have been stated, that it is of the utmost con-

sequence to be possessed of an accurate history of diseases. 1st. It is by this only that they can be duly discriminated. 2dly. It assists in teaching us what the powers of unassisted nature are equal to, so as to ascertain what is expected from art, and what is imputable to it. 3dly. It gives us an insight into their nature, prevention, and cure, by acquainting us with the influence of the *juvantia* and *lædentia*, to which those who are the subjects of disease are either necessarily or casually exposed.

I met with several obstacles in instituting enquiries, purely medical, to the extent I could have wished. There are, in the first place, from the nature of the subject, as has been already explained, certain difficulties attending all practical enquiries in medicine. But, besides this difficulty belonging to the nature of the subject, there were others connected with the actual state of the service; for the hospitals were at times so inadequate in point of size, and so ill provided with necessary articles and accommodations, particularly during the first part of my attendance, that my principal care was to remedy these defects by proper superintendence and representation.

A due attention to air, diet, and cleanliness,

ness, is not only more essential than mere medical treatment, but the sick cannot be considered as fit subjects for evincing the powers of medicine till they are properly provided for in these respects. These inconveniences were owing, in a great measure, to the unusual extent of the service; for there was a much greater naval force in those seas at this period than was ever before known, and there was of course a proportional want of accommodation for the sick. Towards the end of the war these difficulties were much obviated, so that a fairer field of observation presented itself.

Another obstacle to my practical enquiries was, that the fleets I belonged to seldom remained more than six weeks or two months at any one place, so that any series of observations that might have been instituted was interrupted, and I was in a great degree deprived of the fruits of them, by not seeing the event of cases under my management.

The peace in the spring of the year 1783 put an end to all my enquiries, and particularly prevented me from following out some practical researches. I have ventured, however, in one part of this work, to give the



result of my experience in some diseases, more especially such as are peculiar to the climate and mode of life.

Upon the whole, I have, in the following work, humbly attempted to follow what I conceive to be the only true method of cultivating practical medicine, that is, to collect and compare a great number of facts. A few individual cases are not to be relied on as a foundation of general reasoning, the deductions from them being inconclusive and fallacious, and they are liable to be turned and glossed, according as the mind of the observer may be biased by a favourite prepossession or hypothesis. It has been my study to exhibit a rigid transcript of truth and nature upon a large scale, and to take the average of numberless particular facts, to serve as a groundwork for observation; and I have endeavoured to analyse and collate these facts, by throwing the monthly returns that were made to me into the form of tables, as the most certain and compendious way for finding their general result.

With regard to practical subjects, I have endeavoured to found my inferences entirely upon experience; and wherever theoretical  
views

views of the subject seem to have thrown any useful light, I have put it in the form of notes.

The first edition of this work appeared in 1785. It was reprinted in 1790, and having been for some time out of print, I feel it incumbent on me, from every principle of duty, to bring forward the present edition, with all the improvement in my power to bestow upon it. Since the first materials for it were collected, sixteen years ago, I have been twelve years physician to St. Thomas's hospital; and ever since my resignation of that office in 1795, I have been one of the commissioners of sick and wounded seamen, during which time this country has been at war with all the great maritime powers of Europe\*. These opportunities,

\* Some idea may be formed of the magnitude of our marine at this time, from considering that the number of seamen and marines, voted last session of Parliament, is a hundred and twenty thousand; and I am assured, from the best authority, that the number actually employed somewhat exceeds this. The subjoined statement, extracted from a monthly publication, will serve also to show upon what scale the service is at this moment; and whoever reflects on the present extent of our naval establishments, the late unrivalled achievements of our fleets, and the immense consequence of them at this crisis, not only to these kingdoms, but to all Europe, will be sufficiently disposed to admit

tunities, as well as my private practice, have enabled me to make some improvements and additions to this work, which I hope will not be thought unimportant. Besides reviewing and correcting the subjects formerly treated of,

the importance of preserving the lives and health of our seamen.

1st June, 1799.

Monthly statement of the distribution of the British naval force, exclusive of the hired armed vessels, which are chiefly employed in protecting the coasting trade of Great Britain.

	Line.	50's.	Frg.	Sps.	Tot.
In port and fitting - - - - -	7	2	48	127	184
Guard-ships, hospital-ships, and prison-ships, at the several ports	36	3	3	0	42
In the English and Irish channels	28	2	34	51	115
In the Downs and North seas -	12	4	12	33	61
At the West India islands, and on the passage - - - - -	5	0	22	25	52
At Jamaica - - - - -	6	1	16	14	37
In America and at Newfound- land - - - - -	2	1	9	9	21
East Indies, and on the passage -	8	5	13	14	40
Coast of Africa - - - - -	0	0	1	1	2
Gibraltar and Mediterranean -	43	1	29	21	94
Total in commission -	147	19	187	295	648
Receiving ships - - - - -	9	1	5	0	15
Serviceable and repairing for ser- vice - - - - -	4	0	5	0	9
In ordinary - - - - -	20	2	34	34	90
Building - - - - -	15	2	8	2	27
Total -	195	24	239	331	789

of, I have added two new articles. One of these is a chapter on ulcers. In the former editions of this work I gave it as my opinion, that they were frequently contagious. I have now undertaken to prove it, and have also endeavoured to lay down the latest and most approved plans of treatment. This complaint has at all times been a most serious and afflicting evil in the sea service; but has prevailed to so uncommon a degree on several stations during this war, that though I had never been conversant in their treatment myself, I felt it my duty to communicate what I had met with in surgeons journals and reports, as well as books and conversation. The other new article is the chapter on casualties.

The attention of the Board to which I belong, has also been more confined to medical objects, in consequence of the care of prisoners of war in health having been transferred to the transport board at the time of my appointment, and the examination and appointment of surgeons and surgeons mates of the navy having been at the same period vested in the medical board.

It has therefore been my study to contribute all in my power to the improvement of the medical service of the navy, by assisting  
in



in framing and introducing new regulations and instructions ; and I should be wanting in truth and justice, if I did not here acknowledge the zealous and effectual co-operation which I have met with from my colleague, Dr. James Johnston, whose great knowledge of the service can only be equalled by his active and unremitting exertions in advancing its interests. We must leave it to others to say, how far the present unexampled state of health of the navy is owing to our labours.

The method I propose to follow in this work is, first, to deliver the history of the different voyages and expeditions, so far as relates to health, giving an account of the prevalence and nature of the diseases and mortality on board of ships and in hospitals.

Secondly, To deduce, from observations founded on these facts, and also from the former experience of others, the causes of sickness in fleets, and the means of prevention.

Thirdly, To deliver some practical observations on the cure of the most common diseases and casualties incident to a sea life.

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## E R R A T A.

Page 3, line 14. Insert after *them*, "but it ought to be observed that the Montague was built of winter-felled timber."

P. 65. In the marginal reference for *I* read *L*.

P. 178. In the last line for 100,000, &c. read 110,000, but only 104,900 were actually employed. The greatest number voted in the preceding war was 88,000.

P. 214. l. 15. After *dog* insert "and the cow-pox."

P. 307. For Sect. III. read Chap. III.

P. 314. For Chap. III. and Chap. IV. corrections corresponding with the two last, to be made in the 'Table of Contents.

P. 416, l. 2. For *beat* read *part*.

P. 430, l. 20. Before *merit* insert *it*.

P. 479, l. 9. For *description* read *descriptive*.

P. 510, l. 6 and 7. For *so that* read *for*.

P. 526, l. 8. For *cupprum* read *cuprum*.

P. 530, l. 5. For *flava* read *flava*.

P. 586, l. 2. from the bottom of the page, for *regulam* read *regulam*.

P. 590, l. 5. from the bottom, insert *non* before *omnino*.

P. 622, In the last two lines of the page, the following words should have stood as a marginal note; "It should have been added, *the putting the infected clothes into a heated oven.*"



# OBSERVATIONS &c.

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## PART I.

### BOOK I.

Comprehending the MEDICAL HISTORY  
of the FLEET, from March 1780, till  
August 1781.

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#### CHAP. I.

**D**URING the war, which broke out with France in 1778, and with Spain in 1779, the West Indies was the principal seat of naval operations, and much greater fleets were then employed in that quarter of the world than in any former period.

Though there had been a great squadron on the Caribbee station during the greater part of 1779, no physician was appointed to it till the beginning of the next year, when I arrived there in that character with my friend and patron, Lord Rodney.

There were then sixteen ships of the line on that station, most of which had been

B                      upwards



upwards of twelve months in the climate ; and they were reinforced at this time by five more from England.

The squadron which we found on the station was then extremely healthy, and in several of the ships there was not a man unfit for duty. We were told, however, that they had all been subject to sickness, particularly to the dysentery, soon after their arrival in that climate. Of the five with which the fleet was at this time reinforced, all but the *Intrepid* left England at Christmas, making part of the squadron which effected the first relief of Gibraltar, under the command of Lord Rodney, who continued his route to the West Indies, in order to take the command on the Windward station, where he arrived on the 16th of March. The *Intrepid* had arrived with a convoy the day before. These five ships were all pretty healthy on their passage, except the *Sandwich* and *Terrible*, in which a fever prevailed ; but they had almost recovered from it before they arrived in the West Indies. A dysentery broke out in April in all the ships newly arrived, and it prevailed to the greatest degree in those

†

which

which had been most affected with fevers in Europe, namely, in the *Terrible* and *Intrepid*. The *Sandwich* and *Ajax* were also affected, though in a less degree; but the *Montagu*, though this was her first voyage, and though she was just off the stocks, had been the most healthy of any of them from the time of leaving England, and continued so during all this campaign. I have not observed that new ships are more unhealthy than others, unless they are built of ill-seasoned timber; and they have this advantage, that there is no previous infection adhering to them. What may have contributed also to the superior health of the *Montagu*, was the precaution that was taken when this ship was first manned and fitted out, of stripping and washing the men that were brought from the guardship to complete the crew.

The *Intrepid*, while in England, had been afflicted with fevers to a most uncommon degree: for being one of the fleet in the Channel cruize the year before, almost the whole crew either died at sea, or were sent to the hospital upon arriving at Portsmouth. This ship, after refitting, was pretty heal-

thy for a little time; but, probably from the influence of the old adhering infection, she became extremely sickly immediately after joining our fleet, and sent two hundred men to the hospital the first two months after arriving in the West Indies. Most of these were ill of the dysentery.

The Pegasus frigate arrived with the ships from Gibraltar, and we have here an instance of the superior health commonly enjoyed by this class of ships over ships of the line; for when she was dispatched to England in the end of April, there had not been a man taken ill from the time of her arrival on the station.

This season was a very active one in the operations of war; for, besides the general battle of the 17th of April, there were two partial actions in May; and, from the 15th of the former month till the 20th of the latter, our fleet was constantly in the face of the enemy's, except for a few days that it was refitting at St. Lucia after the first battle. This was extremely harassing to the men, not only from the incessant labour necessary in the evolutions of the fleet, but by their being constantly at quarters with the  
ships

ships clear for action. In that situation, they had nothing to sleep upon but the bare decks; for it is the practice in ships of war, when about to come to action, to remove the hammocks and bedding from between decks, where they might embarrass the men in fighting, and to employ them in barricading the ship, which is done by placing them in ranges on the gunwale, to cover the men from the enemy's grape and small shot. These hardships were productive of some sickness, though much less than might have been expected; for the weather is at all times warm, and it was at this time extremely moderate and dry. Besides, we shall see in other instances as well as this, that, in the ardour inspired by the presence of an enemy, men are less exhausted by their exertions and less susceptible of noxious influence, than on ordinary and less interesting occasions.

Almost the whole of the sick and wounded, to the number of 750, were put on shore at Barbadoes, where all the fleet arrived on the 22d of May, except three 74 gun ships, which were so damaged in the battles that they could not beat to windward, and bore away for St. Lucia.



I now began to keep regular and methodical accounts of the sickness and mortality in the fleet, though in a manner more imperfect and less accurate than was afterwards adopted. I was embarked on board of the Sandwich, where the Commander in Chief had his flag, so that I was always present with the main body of the fleet, whether at sea or in port.

A form of monthly returns \* was adopted, which, as well as other points of method, was afterwards improved.

After

\* The following may serve as a specimen of these returns :

STATE of HEALTH of His Majesty's Ship *ALCIDE*,  
Carlisle Bay, Barbadoes, 1st June, 1781.

Sick now on Board.	Died in the course of last Month.	Sent to the Hospital in the course of last Month.
Fevers - - - 4	Of Fever 1	Ill of Scurvy 35
Flux - - - 5		
Scurvy - - - 26		
Catarrh and Rheumatism } - 7		
Total - 42		

#### R E M A R K S.

During the course of last month we had one hundred and fourteen of the men, who contracted the scurvy in the

After collecting the returns for each month, I made abstracts of them in tables; in one column of which the complement of each ship is set down, in order to form calculations of the comparative prevalence and mortality of different diseases at different times. One of the abstracts is here inserted, (Table I. p. 9.) by way of specimen, and the proportional result of them for fourteen months, is set down in another table, (Table II. p. 16.)

Though

the late long cruise, recovered by the use of limes, which were procured at Montserrat. A pint of wine, with an equal quantity of water, made agreeable with sugar and tamarinds, is served to each patient daily. The regimen is exactly the same as mentioned last month.

Since we came into port, very few have been seized with scurvy, but several complain daily of fluxes and feverish complaints, none of which seem at present to be of any consequence.

Four patients have last month complained of an almost total blindness towards evening, accompanied with head-ach, vertigo, nausea, and a sense of weight about the præcordia. The pupil is then extremely dilated, but contracts readily when a strong light is presented to it. Two of them had the scurvy in a high degree, one of them slightly, and the other seemed entirely free from it. I am not well acquainted with the nature or cure of this disease, which I believe is called Nyctalopia by some systematic writers.

Though this last exhibits a tolerably just view, yet it may be remarked, as one imperfection, that there was no distinction made at this time in my returns between the killed and those who died of disease; so that in the month of May, which stands first, the proportion is too high; for there were sixty-four killed, and two hundred wounded, in the two actions of that month.

I gave those who were affected with it an emetic, which brought up a great deal of bile, and relieved the symptoms both of the head and stomach. This encouraged me to a repetition of it, which seemed also to be attended with benefit. I likewise applied blisters behind the ears, and gave bark and elixir of vitriol, with the antiscorbutic course, to those that required it.

I can form no probable conjecture concerning the cause of this disease. I have observed a dilatation of the pupil in scorbutic patients, and they complained of a cloud before their eyes, with imperfect vision, which disappeared as the scurvy went off.

WILLIAM TELFORD.

To Dr. BLANE,

Physician to the Fleet.

## T A B L E I.

ABSTRACT OF RETURNS, 1st JUNE, 1781.

S H I P S' N A M E S.	Complement.	Sick and Wounded on Board.	Sent to the Hospital in the course of last Month.	Died on Board in the course of last Month.
Sandwich - - -	732	28	36	2
Barfleur - - -	767	133	22	1
Gibraltar - - -	650	67	88	10
Triumph - - -	650	7	9	2
Centaur - - -	650	45	26	5
Torbay - - -	600	31	57	5
Monarch - - -	600	62	14	2
Terrible - - -	600	85	24	1
Alfred - - -	600	57	38	1
Ruffel - - -	600	44	134	7
Alcide - - -	600	42	35	1
Shrewsbury - -	600	30	23	5
Invincible - -	600	50	63	9
Resolution - -	600	107	54	3
Ajax - - -	550	20	10	2
Princessa - - -	560	88	40	5
Belliqueux - -	500	19	0	1
Prince William -	500	25	14	2
Panther - - -	420	16	6	0
Triton - - -	200	5	1	0
Hyena - - -	200	11	0	0
Cyclops - - -	200	5	2	0
Total - - -	11,979	977	696	64



The main body of the fleet lay at Barbadoes till the 6th of June, and the men had recruited extremely by their stay there; for vegetables, fruit, and other refreshments, can be procured at an easier rate, and in much greater plenty, at this island, than any other on the station.

The fleet arrived at St. Lucia the next day after it sailed from Barbadoes, and remained there till the 18th of June. The whole of this month was showery at this island, though it is not accounted the common rainy season; but more rain falls here than at any of the other islands at that time in our possession, being the most mountainous, as well as the most woody and uncultivated, of them all. These rains produced some increase of sickness, but very little, when compared to what took place at the same time in the army on shore, and in the ships refitting at Carenage. There died about this time from fifty to fifty-five men every week in an army of not quite two thousand men.

The difference in point of health between the Carenage (which, as the word implies,  
is

is the place where ships go to be hove down, or otherwise repaired) and Gros-Islet Bay, where the main body of the fleet lay, affords a striking proof of the effects of situation. The Carenage is a land-locked creek, with a marsh adjacent to it, whereas the other is a road open to the fine air of the sea, the only land sheltering it to windward being a small, dry island, consisting of one hill, of half a league in circumference, and some of the cliffs of the main island of St. Lucia.

The increase of sickness here was farther prevented by the men having little labour to perform on shore, nor any haunts to encourage intemperance; a vice which the Admiral endeavoured still more effectually to prevent, by ordering all the rum stills in the neighbourhood to be destroyed.

It may be proper here to introduce a general account of the seasons and temperature of the West Indies, as there will be frequent occasion hereafter to make allusions to them. With regard to the heat, though the range of the temperature is very small, in comparison of what it is in Europe, the variations follow the same seasons; for July and August are the hottest months, and December

cember and January the coolest. This we would naturally expect, as our plantations lie all in the northern hemisphere, between the 10th and 20th degree of N. latitude, and therefore bear the same relation as Europe does to the sun's annual course. The hurricanes happen in the same season in which the periodical rains chiefly fall, that is, in the months of August, September, and October, which are called the hurricane months, and this is also the most unhealthy season. The time of the year which is most apt to be rainy, next to this, is from the middle of May to the middle or end of June, but this is not invariable. The lowest I ever observed the thermometer was at  $69^{\circ}$ . This was at sunrise in Barbadoes in December. It stands very commonly at  $72^{\circ}$  at sunrise, in the cool season, rising to  $78^{\circ}$  or  $79^{\circ}$  in the middle of day. In the hot season; the common range is from  $76^{\circ}$  to  $83^{\circ}$ . It seldom exceeds this in the shade at sea; and the greatest height at which I ever observed it in the shade at land was  $87^{\circ}$ . This is far short of the extremes of heat which are experienced at certain seasons on the continent of North America, even very far north. In Pennsylvania and New York,

and

and even Canada, the thermometer, I have been assured, rises frequently above  $90^{\circ}$ . It does so commonly enough in the continental parts of the East Indies; but in the Islands \* there the heat is much the same as in the Caribbee islands. The heat therefore in these islands may, comparatively speaking, be considered as moderate and steady.

The comparative mortality in June is small, owing to the fleet's having been cleared of all the bad cases at Barbadoes before it sailed from thence. Though the proportion of sick in July is less, that of the mortality is greater, (see Table II.) which seems to be owing to this circumstance, that the cases taken ill during the rainy weather of June did not terminate fatally till the succeeding month.

In the course of this summer the fleet was reinforced by several ships of the line from England. The *Triumph* arrived in May, without any sick on board; but a flux prevailed a few weeks afterwards, without any evident cause, except the influence of

\* See Marsden's History of Sumatra.



the climate, and the exposure and fatigues during the operations of May. The disease, however, soon subsided, and the ship being kept in excellent order and discipline, continued healthy during all the remaining time in which she served with us.

In June, the *Russel*, of 74 guns, arrived from North America, and the *Shrewsbury*, a ship of the same rate, from England. The former left England in 1778, but was obliged to put back by stress of weather and sickness, and upon arriving afterwards on the coast of America, was extremely afflicted both with fevers and the scurvy. These were removed to the hospital, and this ship had become free of all sickness before sailing for the West Indies, except that a few of the men were seized with fevers, and she remained healthy after arriving there, not suffering from any regular attack of sickness, such as affected the ships in general from Europe. The *Shrewsbury* left England healthy, but was soon attacked with a fever and flux, which continued to prevail till the end of the year.

The fever in these two ships resembled  
rather

rather the low ship fever of Europe than the bilious one peculiar to the climate. This last, indeed, seldom or never prevails to a great degree on board of a ship, unless it has been caught on the watering duty, or from some other exposure to the air of the land. I have, however, known a few instances of bilious fevers in men who never had been on shore from the time they left England; I have even known men of the same description attacked with intermittent fevers, which are supposed to depend still more on land air. This is perhaps owing either to the quantity of water in a great ship, part of which is always more or less putrid, or to the fresh-cut wood of the country taken on board for fuel, the steam of all which must resemble a good deal the effluvia of woods and marshes, which are supposed to give rise to intermittents.

In the beginning of July our fleet was reinforced with the Culloden, Egmont, and Centaur, all of 74 guns. In the end of the same month we were joined by the Alcide and Torbay, of the same rate, and also directly from England. The fleet was at this time at St. Christopher's, having arrived there

there on the 22d of the month, with a large convoy from England, which had joined it at St. Lucia, under protection of the Thunderer and Berwick, two ships of the line; which being bound to Jamaica, I do not reckon as belonging to our fleet.

## T A B L E II.

Shewing the proportional Sickness and Mortality in relation to the whole Numbers on board, for fourteen Months.

M O N T H S.	Proportion of Sick and Wounded on board on the First of the Month.	Proportion of Sick and Wounded sent to the Hospital in the Course of the Month.	Proportion of Deaths on board in the Course of the Month.
May, 1780 -	18 $\frac{1}{2}$	20 $\frac{1}{2}$	87
June - - -	13	68 $\frac{1}{2}$	418
July - - -	17 $\frac{1}{2}$	80	163
August - - -	18	227	80
September - - -	9	6	188
October - - -	14	25	0
November - - -	33 $\frac{1}{2}$	192	265
December - - -	16	67	185
January, 1781	14	60 $\frac{1}{2}$	316
February - - -	18	413	214
March - - -	15 $\frac{1}{2}$	30	201
April - - -	11	59	169
May - - -	9 $\frac{1}{2}$	17	188
June - - -	12	40	701
Mean Proportion	- 15 $\frac{1}{2}$	- 93	- 227

## C H A P. II.

THE hurricane months approaching, the season for active operations in the West Indies was now over. The whole force of the enemy, consisting of thirty-six French and Spanish ships of the line, having gone to St. Domingo in the end of July; ten sail of the line were detached after them from our station, for the protection of Jamaica. The Admiral sailed for North America in August, with eleven ships of the line, leaving six for the protection of the islands.

There was little alteration in the general state of the sick during the voyage to America, and indeed we found no diminution of the West-India heat, which at this season is at the greatest height, until we came to the  $33^{\circ}$  of N. latitude.

The only material alteration in point of health was in the Alcide and Torbay, which had arrived from England with a few men ill of fevers; but in the course of this

C

voyage



voyage these two ships became as unhealthy as any that ever came under my observation. There was a greater number of sick on board of them than of all the fleet besides, and it increased to such a degree, that upon their arrival at New York, which was in the middle of September, after a passage of three weeks, near one half of their men were unfit for duty. In the Alcide it was a fever that raged; in the Torbay it was a dysentery; and the unusual degree of sickness and mortality which appears in the Table for the month of September, was owing to the very sickly state of these two ships.

We shall hereafter see reason for supposing that fever and dysentery proceed from the same cause; and as both these ships arrived from England in a similar state with regard to health, fevers would probably have been the prevailing disease in both; but a part of the 87th regiment, then serving as marines in the fleet, was put on board of the Torbay at St. Christopher's, and some of them being ill of the dysentery, probably gave this turn to the disease which afterwards prevailed on board. I have formed a Table to shew the fluctuating state of these two diseases,



[To face Page 19.]

# T A B L E III.

Shewing the Number of FEVERS and FLUXES on board on the First of each Month, and the Number sent to the Hospital in the Course of the Month.

SHIPS' NAMES, AND Date of their Arrival.	MAY, 1780.		JUNE.		JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.		JANUARY, 1781.	
	Fever.	Flux.	Fever.	Flux.	Fever.	Flux.	Fever.	Flux.	Fever.	Flux.	Fever.	Flux.	Fever.	Flux.	Fever.	Flux.	Fever.	Flux.
	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.	On board. Sent to the Hospital.
Sandwich, 16th March	6	0 16 19	3	0 12 0	10	5 16 3	20	0 5 0	16	4 5 2	5	9 4 0	3	0 5 0	8	0 10 0	9	0 13 0
Terrible, 16th March	0	0 40 20	0	3 86 75	3	25 60 24	25	0 30 13	19	12 41 9	2	0 3 0	continued quite healthy.					
Triumph, 7th May -		0	0	0 0 0	0	0 32 17	5	0 7 0	0	0 3 0	continued healthy.							
Ruffel, 18th June - -					22	0 0 0	10	3 0 0	continued healthy.									
Shrewsbury, 26th June					5	0 0 0	14	0 12 0	20	0 20 0	No Return, the Ship being absent.				0	0 13 0	1	0 7 0
Alcide, 30th July - -							17	0 0 0	54	0 3 22	20	2 59 37	0	0 23 10	0	0 14 0	6	5 17 0
Torbay, 30th July - -							6	0 3 0	3	0 169 143	3	0 12 0	6	0 5 0	0	1 22 30	5	0 10 1
Monarch, 22d Nov. -															3	0 2 0	5	12 15 4
Alfred, 22d Nov. - -															6	0 5 0	15	16 11 8

eases, and this was one of my first and most imperfect attempts towards a medical history of the fleet in a methodical way. (Table III.)

There was but little sickness in the rest of this squadron, except in the *Terrible*, where the dysentery prevailed a good deal. None of the ships of the line which we found in the West Indies, upon our arrival there, were now in company, except the *Yarmouth*, and this was the most healthy of all the ships that went to North America.

The health of the fleet was very much recruited by the stay in America, though it was short; for the men were supplied with fresh meat and spruce beer, and they enjoyed the two finest months of the year in that temperate climate. The squadron left New York in the middle of November, and though dispersed by a violent storm, all the ships arrived safe in the West Indies before the middle of December.

In October the fleet had attained such a degree of health, that though the calculation in the Table is made from five of the



most sickly ships, no death happened in this month on board of any of them. In November the mortality was also inconsiderable, though the ships left in the West Indies are included in the calculation; which, had it been made upon those only that went to North America, the deaths would have been no more than one in seven hundred and eleven in this month, which is rather less than that of any other month in the Table.

The amendment in health, in consequence of the change of climate, was most remarkable in the *Terrible*, which, by the time she left America, had entirely got rid of the violent dysentery that had prevailed for some time on board. This sudden change in the health of this ship was evidently owing to the great attention of the Captain to cleanliness and discipline, and no less to the assiduity and abilities of the Surgeon. The *Alcide* still continued sickly, though not so much so as the *Torbay*. The former had sailed on a cruise in October, and having met with very rough weather, the sick list was thereby increased. The dysentery now prevailed in that ship, as well as

5 fevers,

fevers, and those men chiefly were attacked with fevers who were ill of the scurvy, or recovering from it. This was not very common; and there were several other remarkable particulars with regard to the fevers in this ship; for her men were not only uncommonly subject to this disease, both in America and the West Indies, but to all the various forms of it; the low infectious ship fever of Europe, the bilious remitting, and the malignant yellow fever of hot climates. It would appear from this, as well as other instances, that a ship may assume, as it were, a particular constitution, or a tendency to some particular disease, for a length of time, and this depending on some lurking and adhering infection, or the manner in which she may have been victualled, watered, or manned, the habits in point of discipline, ventilation, and cleanliness, and the accidental exposure to cold, fatigue, or land air.

The great benefit derived to the health of the fleet, from the change of climate, as well as other reasons, justified the Admiral in going to North America. Upon our return we found there was great good fortune in it,

as well as wisdom ; for there had happened on the 10th of October a more violent hurricane than any in the memory of man, and the ravage it made both by sea and land is, perhaps, unparalleled in history. Several of the ships of the line were exposed to it ; but though they suffered extremely, and were in the utmost danger, none were lost. Two of them happened to be at Antigua, which was out of the track of this hurricane, as it extended only from the 12th to the 15th degree of N. latitude: so that the only islands that suffered by it were Barbadoes, St. Lucia, St. Vincent, and Martinico.—Four frigates, and as many sloops of war, either foundered or were wrecked, and about one thousand seamen perished in them. One of the buildings of the hospital at Barbadoes was entirely demolished by the impetuosity of the sea, which, having risen to a great height, dashed a ship against it, and twenty-three seamen were buried in the ruins\*.

The

\* Although this hurricane, in itself and its consequences, was so destructive to the lives and health of men, yet, with regard to the inhabitants on shore, it had a surprising and unexpected effect in mending their health.

The Montague suffered most on this occasion, and was also most subject to sickness and mortality, brought on in consequence of the great fatigue and hardships of the men in bringing her into port and refitting her; for the ship was almost torn to pieces both in the rigging and hull, and the bedding and other necessaries and conveniencies were

health. I wrote an account of this hurricane to the late Dr. William Hunter, who communicated it to the Royal Society, and the following passage is extracted from it:

“ The consequences of this general tumult of nature,  
“ on the health of man, was none of the least curious of  
“ its effects. I made much inquiry on this head, not  
“ only of the medical gentlemen who had the charge of  
“ hospitals, and of the physicians of the country, but of  
“ the inhabitants, and every one had some cure to relate  
“ either of themselves or their neighbours, in a variety of  
“ diseases. Nor could I find that either those who were  
“ in health, or those who were ill of any disease what-  
“ ever, suffered from it, otherwise than by its mechanical  
“ violence; but, on the contrary, that there was a general  
“ amendment of health. This is a fact, which I could  
“ neither credit, nor would venture to relate, were it not  
“ supported by so many concurring testimonies. It had  
“ a visible good effect on the acute diseases of the climate.  
“ The chronic fluxes, of which there were then some at  
“ the naval hospital, were cured or much relieved by it.  
“ But the diseases upon which it had most evident and  
“ sensible effects, were pulmonic consumptions. Some



were entirely destroyed. The fever that prevailed on board at this time was of the most malignant kind known in this climate; and the worst cases arose in watering, and the other necessary duties on shore, from which the men would sometimes return frantic, and die in a few hours. There was a party of soldiers on board; and as they were

“ recent cases of phthisis, and even the acute state of  
 “ pleurisy, was cured by it; and in the advanced and in-  
 “ curable state of it, the hectic fever was removed, and  
 “ remarkable temporary relief afforded. A delicate lady  
 “ of my acquaintance, who was ill of a pleurisy at the  
 “ time, and passed more than ten hours in the open air,  
 “ sitting generally several inches deep in water, found  
 “ herself free of complaint next day; had no return of it;  
 “ and when I saw her a few weeks after, was in much  
 “ better health and looks than usual. The people ob-  
 “ served that they had remarkably keen appetites for  
 “ some time after, and the surviving part of them became  
 “ uncommonly healthy; some of both sexes, whom I  
 “ had left fallow and thin a few months before, looking  
 “ now fresh and plump.

“ It is very difficult to account for this, as well as every  
 “ thing else in the animal œconomy; but it was probably  
 “ owing in part, at least, to the very great coldness and  
 “ purity of the air from the upper regions of the atmo-  
 “ sphere.”

It is observable that long calms are extremely favourable to epidemic diseases, particularly when concurring with heat. It is remarked in Maitland's History of  
 London,

were not called upon to perform any duties on shore, they had but little sickness in comparison of the sailors.

The other ships having suffered less from the storm, were also less sickly, as it was not necessary for them to remain so long in the unhealthy Carenage to repair.

The only disease that prevailed at this time, in these two ships, was fever, there

London, that for many weeks before the breaking out of the last plague in this city, which was in the end of summer 1665, there had not been for many weeks before the least breath of wind, not even enough to turn a vane. The like was observed at Philadelphia before the breaking out of the yellow fever in 1792, the ravage of which was nearly equal to that of the pestilence. And the frequent prevalence of direful epidemic fevers in the West India islands, above what is known in other tracts similarly circumstanced in point of climate, is probably owing to that particular condition of the atmosphere which renders this part of the world liable to hurricanes. This, according to \* Dr. Franklyn, consists in a want of due admixture in the several *strata* of the atmosphere. It is in the agitation producing this admixture that the salutary operation of wind consists. It is farther in favour of this opinion, that these epidemics begin to rage a little before the periodical return of the hurricane season, and we have seen that the effect of these convulsions of nature is to produce a more healthful atmosphere.

\* See Essays by Dr. Franklyn.

being few or no fluxes, though they had been so frequent in the former part of the year. Though fevers and fluxes depend on the same general causes, yet when these causes exist in a higher degree, it would appear that they are more apt to produce fevers. Thus the exhalations of the earth from marshes are more apt to produce fevers; and mere excesses of heat and cold, or moisture, are more apt to produce fluxes; just as in Europe a catarrh, which may be considered as a local febrile affection, as well as a dysentery, will be excited by exposure to cold or damp, without any specific bad quality in the air.

The Ajax and Montague are the only two ships of those left in the West Indies, which are included in the estimate of sickness and mortality in November and December, and they bear a very great proportion to the whole; for out of forty-four that died in fourteen ships of the line in November, twenty died in the Montague, and five in the Ajax; and out of forty-three, the whole number of deaths in December in twenty-one ships of the line, ten were of the Montague, and eleven of the Ajax.

## C H A P. III.

WE are now come to that period in which our fleet was reinforced with seven ships of the line, which arrived at Barbadoes from England on the 5th of January, 1781, under the command of Lord Hood. This addition, with two which had arrived in November, made the force upon this station again amount to twenty-one ships of the line.

The whole fleet was tolerably healthy during this month, the season being dry and cool. There was, however, a small increase of sickness at this time, and it was owing to a descent made on St. Vincent's in December. The land troops, (of whom there was still a regiment on board of the fleet) the marines, and some of the seamen, had been on shore for one night only; but many of them having lain on the ground, some having been intoxicated, or having eaten to excess of sugar-cane and fruit, caught fevers and fluxes, which increased the proportion of diseases and deaths in the following months, as appears by the Table.

I have



I have exhibited in another Table, a view of the sickness and mortality of this fleet for the five succeeding months. (Table IV.) This account, as well as most of those that are to follow, is confined to three diseases, that may be called the sea epidemics. These are, fever, flux, and scurvy.

The whole fleet assembled at Barbadoes on the 13th of January, but no service was undertaken till the accounts of the Dutch war arrived on the 30th of that month. In consequence of this intelligence, the greater part of the ships of war went against St. Eustatius, which was taken on the 3d of February.

Ten days after this a squadron of seventeen ships of the line was sent to cruise to windward of Martinico, with a view to intercept a French squadron which was then said to be on its passage from Europe. The cruise was there continued for six weeks; after which small divisions of the ships were sent to water and refit, by turns, at St. Lucia, and were relieved by the ships left for the protection of that island.

Soon

T A B L E IV.

Shewing the Number of each Disease on board on the First of each Month, the Numbers sent to the Hospital, and Dead, in the Course of the Month.

SHIPS' NAMES.	FEBRUARY, 1781.									MARCH.									APRIL.									MAY.									JUNE.									
	Fever.			Flux.			Scurvy.			Fever.			Flux.			Scurvy.			Fever.			Flux.			Scurvy.			Fever.			Flux.			Scurvy.			Fever.			Flux.			Scurvy.			
	On board.	Sent to the Hospital.	Dead.	On board.	Sent to the Hospital.	Dead.	On board.	Sent to the Hospital.	Dead.	On board.	Sent to the Hospital.	Dead.	On board.	Sent to the Hospital.	Dead.	On board.	Sent to the Hospital.	Dead.	On board.	Sent to the Hospital.	Dead.	On board.	Sent to the Hospital.	Dead.	On board.	Sent to the Hospital.	Dead.	On board.	Sent to the Hospital.	Dead.	On board.	Sent to the Hospital.	Dead.	On board.	Sent to the Hospital.	Dead.	On board.	Sent to the Hospital.	Dead.	On board.	Sent to the Hospital.	Dead.				
N.B. Those marked *, arrived with Lord Hood.																																														
Sandwich	8	0	0	4	0	0	2	0	0	8	3	1	4	0	0	2	2	0	6	0	2	9	1	1	2	4	0	2	2	1	10	5	0	5	18	0	2	0	0	3	0	0	10	0	1	
* Barfleur	8	0	1	4	0	1	3	0	0	28	4	0	35	0	0	5	27	2	24	0	0	25	0	0	33	0	0	12	3	1	10	1	0	54	10	0	20	0	0	13	0	0	58	0	0	
* Gibraltar	25	0	2	4	0	0	4	0	0	8	1	0	0	0	0	6	22	0	0	0	1	0	0	0	0	0	4	0	0	0	0	0	30	22	4	3	1	0	4	0	0	48	17	0		
Triumph	0	0	1	1	0	1	21	8	0	3	0	0	2	0	1	24	18	1	0	0	1	3	0	2	12	0	2	0	1	1	0	0	0	13	8	1	1	0	0	0	0	0	6	5	0	
Centaur	2	0	0	2	0	0	20	0	8	7	0	0	4	0	0	50	0	8	2	0	0	3	1	2	55	1	1	0	0	0	2	0	2	15	4	0	4	0	0	9	0	1	15	0	0	
Torbay	6	0	0	11	0	0	1	0	0	7	0	0	8	0	0	8	0	0	6	0	0	8	0	0	23	27	2	6	0	0	13	7	0	44	31	0	16	0	0	6	0	0	9	0	1	
Monarch	13	0	3	13	0	0	2	0	0	5	0	0	4	0	0	1	0	0	8	0	4	17	0	0	0	0	0	5	2	2	3	0	0	57	11	0	4	3	1	4	0	0	36	5	0	
Terrible	2	0	0	10	0	0	1	0	0	2	0	0	9	0	2	3	0	0	0	0	0	10	0	0	4	3	1	0	0	1	10	4	0	5	20	0	3	1	0	12	0	0	20	1	0	
Montagu	40	0	8	14	0	5	4	0	0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		
Alfred	4	0	0	4	0	0	4	0	0	25	0	0	8	0	1	56	16	2	11	0	0	26	0	1	116	44	4	15	10	1	11	3	0	130	25	2	14	5	5	10	0	0	26	0	0	
Ruffel	0	0	0	7	0	1	2	1	0	7	0	0	8	2	0	61	5	0	0	0	0	4	0	1	44	0	3	0	1	0	8	0	0	132	102	4	0	1	0	19	1	0	14	1	0	
Alcide	1	0	1	9	0	0	1	0	0	1	0	0	1	0	0	15	0	0	1	0	0	3	0	0	8	16	0	0	0	1	1	0	0	40	35	0	4	2	0	5	0	0	26	5	0	
* Invincible	0	0	0	0	0	0	0	0	0	6	1	0	1	0	0	5	6	0	4	0	0	4	0	0	2	0	1	7	0	1	6	8	4	31	54	4	8	0	0	22	0	0	10	1	0	
Resolution	1	0	0	7	0	1	0	0	0	6	0	0	5	0	0	1	0	0	5	0	0	8	0	2	7	0	1	5	2	0	9	0	0	15	45	2	1	0	0	3	12	0	84	0	2	
Shrewsbury	8	0	0	1	1	6	7	0	0	5	0	1	6	0	0	0	0	0	4	3	0	0	0	0	4	6	0	3	1	0	5	2	0	22	6	2	3	5	5	4	5	5	20	5	5	
Ajax	8	0	1	6	0	5	3	0	1	2	0	2	10	0	5	6	0	6	4	0	1	15	4	2	30	5	10	4	1	1	3	0	0	8	0	1	2	0	0	2	0	1	6	0	0	
* Princessa	8	0	1	3	0	1	0	0	0	6	0	5	2	0	0	4	102	2	6	0	0	1	0	0	40	0	1	2	0	0	2	0	1	30	40	2	2	0	0	6	40	0	70	154	0	
Intrepid	18	1	1	10	4	0	1	0	0	1	0	0	9	0	0	0	0	0	9	5	5	13	5	5	1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
* Bellequeux	11	0	0	10	0	5	0	0	0	3	1	2	52	0	1	0	1	0	0	0	0	3	0	0	2	0	0	0	0	0	2	0	0	2	0	0	2	0	1	3	0	0	8	0	0	
* Prince William	21	0	0	17	0	0	4	0	0	23	12	0	47	62	5	6	10	0	19	2	0	147	40	0	16	7	0	5	5	2	53	5	0	7	4	0	4	4	2	13	3	1	8	7	0	
* Panther	2	0	0	4	0	0	0	0	0	5	0	0	8	0	0	4	0	0	2	0	0	4	3	0	9	1	0	3	2	0	8	4	0	1	0	0	3	0	0	8	1	0	1	1	0	
Triton	7	0	0	15	2	0	14	0	0	3	2	0	12	2	0	6	0	0	2	0	0	2	0	0	0	0	0	2	0	0	4	0	0	1	0	0	3	0	0	8	1	0	1	1	0	
Hyena	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	4	0	0	0	0	0	1	0	0	2	0	1	1	0	0	0	0
Cyclops	4	1	0	3	0	0	0	1	0	4	0	0	3	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	5	0	0	
Total	197	2	19	158	7	21	93	19	10	174	24	16	238	67	18	202	265	27	115	5	9	317	49	9	428	115	26	76	30	12	166	39	7	641	436	22	101	12	6	149	57	5	480	198	4	

N. B. Where the Spaces are marked thus, §, no Return was made.



Soon after this, the whole squadron came to leeward of Martinico; and though the former intelligence had proved false, the greater part of our fleet still kept the sea, in order to block up the enemy in Fort-Royal Bay. This they continued to do till the 29th of April, when a French fleet of twenty-two ships of the line, from Europe, joined by four from Martinico, forced their way into their own port, pressing to leeward our fleet, consisting only of eighteen ships of the line; so that the greater part of them did not get into port till they came to an anchor at Barbadoes on the 23d of May.

It was in this season of cruising, and keeping the sea, that the fleet contracted such a degree of scurvy as had never before been known in the West Indies. This disease is not so apt to arise in a hot climate as in a cold one; and the prevalence of it on this occasion was owing to the men having been for a great length of time upon sea victualling; for one part of the fleet had not had a fresh meal from the time of leaving America, that is, for six months; and that part of it which came last from England had been in the same circumstances for seven months;



months; nor had any of them been in a place capable of supplying vegetable refreshments from the time they left Barbadoes in the end of January. But though no fresh meat or vegetables could be procured at St. Lucia or St. Eustatius, yet the scurvy did not make such progress in the ships that lay at anchor there, as in those that were at sea; and it appears that the time in which it prevailed most was, while the greatest number of ships was at sea, that is, in the month of March. It appears, indeed, by the Table, that there was a greater number ill of this complaint on the 1st of May than on the 1st of April; but it appears also, that more were sent to the hospital in March than in April, and very near half of the May list must have been taken ill in March\*. The difference of being in port and at sea consists chiefly, 1st, In there being plenty of water while in port, so that it can be used freely, not only to drink, but to wash the clothes; and we know that cleanliness tends greatly to ward off the scurvy. 2dly, Though no

\* In order to ascertain more exactly the degree of sickness in each month, a column was afterwards added to the form of the returns, expressing the number taken ill of the several diseases in the course of the month.

fresh meat nor vegetables could be procured at those ports, sugar, which may be considered as a very antiscorbutic article of diet, could always be procured at a very cheap rate, and the seamen, when in port, used to exchange their salt provisions for it. 3dly, There is at sea a dismal uniformity of life, favourable to indolence and sadness, and therefore tending to hasten the progress and aggravate the symptoms of the scurvy; whereas the change of scene and variety of objects, when in port, tend to cheer and amuse the mind, and thereby to avert this disease.

The squadron that came from England under Lord Hood, suffered, upon the whole, much less from acute diseases, during the first months of their service in this climate, than the ships that arrived with Lord Rodney, which was probably owing, in part at least, to the former having arrived at the driest and coolest season of the year. The *Barfleur*, however, had a large proportion of all the three prevailing diseases; and large ships are in general more subject to them than those of a smaller rate. But of all the ships in the fleet, the *Alfred* had the greatest proportion

proportion of the three sea epidemics. The Prince William suffered more than any other ship in the fleet from the flux, and the Princessa from the scurvy. In some instances, reasons can be assigned for the prevalence of particular diseases in particular ships, such as accidental infection, or the manner in which they have been victualled, manned, or disciplined; but in many cases the cause is so subtle or obscure as to elude our inquiry.

The most healthy of the new squadron, during this campaign, were the *Bellicieux* and *Panther*; the former was a new ship, and came from England with a very irregular and ill-disciplined crew. Soon after arriving in this climate, she was threatened with a dysentery, which, though it spread a good deal, did not prove severe nor mortal; but being left at St. Eustatius on this account, while the rest of the fleet was cruising, she soon became very healthy, and remained so. This is the second instance we have had occasion to remark of a new ship being healthy.

The

The Panther preserved her health by being on small separate cruises, and frequently in port, not being attached to the main squadron. The Sandwich was the only other ship not engaged in the long cruise.

Of the ships lately from England, that were employed in this cruise, the Gibraltar seems to have been the least sickly. This ship left England healthy; but having received a draft of dirty men when upon the eve of sailing, a fever of the infectious kind broke out on the passage, so that she arrived in the West Indies in a sickly state. This fever disappeared very soon after; and it is proved by this, as well as other facts, that a warm climate, so far from tending to generate, or even to foster the infection of fever, tends rather to extinguish it. The Gibraltar had been put under excellent discipline by her former commander, while in the Channel service; and this being afterwards kept up, the men were always clean and regular. This was the Spanish Admiral's ship, taken by the fleet under the command of Lord Rodney off Cape St. Vincent's, in January 1780. She was then

D called



called the *Phoenix*, and was of a singular excellence both with respect to materials and construction; the wooden work being of cedar and mahogany of uncommon thickness, and the iron-work proportionably strong. Whether the cedar contributed to the healthiness, by its balsamic effluvia, I will not pretend to determine.

The *Invincible* was also uncommonly healthy during this cruise, which may likewise be ascribed to good discipline, and to her having been more than three years in commission before sailing from England, whereby the men were brought into order, and accustomed to each other and to a sea life. This ship was almost singular in having no acute diseases for several months after arriving from Europe; but at length paid the tribute to the climate in May and June, as may be seen in Table IV.

From the account of the three frigates at the bottom of the list in the Table, it appears how much more healthy they are than ships of the line. The total complements of the three is exactly equal to that of one seventy-four-gun ship; but their

\*

whole

whole sickness and mortality is less than that of any one ship of the line of that class, although the Triton was uncommonly sickly for a frigate.

There seem to be several causes for the superior degree of health usually enjoyed by this smaller class of ships. There is not only less chance of mixtures of men in frigates, as their complement is smaller, but it is more easy for the captain and officers to keep an eye over a few men than a great number; for, in a great ship, there are generally men, who, concealing themselves in the most retired parts, no one takes cognizance of them, and they destroy themselves, and infect others, by their laziness and filth. In the next place, there is a greater proportion of volunteers and real seamen in frigates, and more landmen and pressed men in ships of the line, the former being more in request, on account of the greater chance of prize money. Lastly, a small ship is more easily ventilated, and the mass of foul air issuing from the hold, from the victuals, water, and other stores, as well as the effluvia exhaling from the men's bodies, is less than in a large ship.

Many other and more minute remarks might be made on different ships in this season of hard service ; but to do this would be tedious, and the inspection of the Tables may suggest observations to the reader. There is a striking and instructive fact, however, with regard to two ships, which I cannot help relating. The Alcide and Invincible, both of seventy-four guns, in working to windward, after the action with the French fleet, on the 29th of April, anchored at Montserrat on the 11th of May, in order to water. They remained there only part of two days, and they procured no refreshment, except a few bushels of limes. The scurvy then prevailed to a great degree in both ships ; but between this time and the 23d of May, when they came to anchor at Barbadoes, sixty men, who had been confined with this disease, were discharged, as fit for duty, from the sick list of the Invincible, and a hundred and fourteen from that of the Alcide. These were the only two ships that had the advantage of the limes ; and during these twelve remaining days of the voyage the scurvy continued to increase in all the other ships.

The

The fleet was supplied with essence of malt during all this campaign; and though it was, no doubt, of service, it was far from having that powerful and manifest effect that the acid fruits had, and certainly did by no means prevent the scurvy in all cases. I have strong testimonies, however, of its beneficial effects from the surgeons of several of the ships, particularly of the Gibraltar, Centaur, Torbay, and Alcide, in all of which it was found either to cure the scurvy in its first beginning, to retard its progress, or to mend the appearance of scorbutic ulcers, and dispose them to heal.

I had conceived that melasses, being a vegetable sweet, must have been a very powerful antiscorbutic; but the greatest part of the last reinforcement of seven ships came from England furnished with this as an article of victualling, as a substitute for a certain proportion of oatmeal, which was withheld agreeably to a late very judicious order of the admiralty. But though I am persuaded that this article of diet mitigated the disease, it was very far from preventing it; and the Princessa in particular, which



suffered most from the scurvy, was well supplied with it.

There is reason to think that it is not in the vegetable sweet alone that the antiscorbutic principle resides, but in this in conjunction with the natural mucilage, such as exists in the malt. I suspect likewise that the change which the essence undergoes in its preparation tends also to rob it of some of its original virtue. But the melasses are still farther altered by being deprived of the natural mucilage by means of quick lime, with which all sugar is clarified in the boilers. Dr. Hendy, of Barbadoes, to whom I have been obliged for several remarks, informed me, that the liquor, before it undergoes this operation, has been found by him to produce the most salutary effects in the scurvy; but as this cannot be had at sea, we had no opportunity of comparing it with other antiscorbutics. It is certain also that the medical effects of the native sweet juices are, in other respects, very different from what they are in their refined state; for manna, wort, and the native juice of the sugar cane are purgative; whereas sugar itself is not at  
all

all so \*. This affords a presumption, that they may be also different in their antiscorbutic quality; and there is reason to think, from experience, that the more natural the state in which any vegetable is, the greater its antiscorbutic quality. Vegetables, in the form of sallads, are more powerful than when prepared by fire; and I know for certain, that the rob of lemons and oranges is not to be compared to the fresh fruit. Raw potatoes have been used with advantage in the fleet, particularly by Mr. Smith, of the Triton, who made the scorbutic men eat them, sliced with vinegar, with great benefit. This accords also with what Dr.

\* I was informed by Captain Caldwell, that when he commanded the Hannibal, of 50 guns, his crew was so much afflicted with the scurvy, in a passage of nine weeks from St. Helena to Crookhaven, in Ireland, that ninety-two men were confined to their hammocks in the last stage of that disease, though they had been supplied with sugar at St. Helena, and served with it on the passage. They remained three weeks at Crookhaven; at the end of which time every man was fit for duty: and though they had fresh provision, they had no fresh vegetables, so that their cure is to be ascribed to the use of lemons and oranges, which the Captain very humanely ordered to be purchased for them from on board of a foreign ship that happened to put into the same harbour.

Mertans\*, of Vienna, has lately communicated to the Royal Society of London.

When the fleet arrived at Barbadoes on the 23d of May, it was found that the number of sick on board amounted to sixteen hundred, and that there was not accommodation for more than two hundred at the hospital. As there was hardly any complaint but scurvy, the Admiral, at my representation, issued an order for serving the sick on board of their own ships with fruit and other vegetables and refreshments, such as milk and soft bread. This course of diet commenced in the beginning of June; and as the greater part of the fleet was near four weeks thereafter in port, they enjoyed the advantages of it during that time; and the very great diminution of sickness and mortality, which appears by the tables in that month, sufficiently evinces the benefit derived from it. In less than four weeks the fleet, from being very sickly, became extremely healthy.

It was remarked, that the men recovered faster on-board than on shore; and it would

† See Philosoph. Transact. vol. 68.

appear

appear that land air, merely as such, can have but little share in the cure of the scurvy, and that the benefit arises from the concomitant diet, cleanliness, and recreation. The expedient of curing men on board of their ships was here suggested by necessity; but it succeeded so well, that it was adopted afterwards in preference to an hospital, which is indeed a useful relief to a fleet where there are contagious, acute disorders; but with regard to scurvy, I am convinced, that on foreign stations, at least, where the accommodations of the sick are more indifferent than in England, many advantages would arise from supplying men with refreshments on board of their ships. It appears that only four men died of this disease in the whole fleet in the month of June, though there were so many ill of it; whereas it appears by the books of hospitals, that scorbutic men die there in a much greater proportion, and chiefly in consequence of other diseases, particularly the flux, which they catch by infection, or bring on by intemperance. It is farther in favour of this scheme, that great numbers of those sent on shore are lost by desertion. It is also a great saving to Government, the expence not being



ing a fourth part of what it would cost at an hospital.

The fleet left Barbadoes on the 10th and 12th of July, and continued healthy till the greater part of it sailed for North America in the beginning of August.

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## P A R T I.

### B O O K II.

Continuation of the MEDICAL HISTORY of the FLEET, from August 1781, till the Conclusion of the War in April, 1783.

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## C H A P. I.

WHEN the main body of the fleet went to America in August, Lord Rodney went to England for the recovery of his health.—Wishing to lay before the public boards several reforms that suggested themselves to me in the course of the late service, I accompanied the Admiral, purposing to return when the season for hostile operations should have brought back the fleet from the coast of America.

Soon

Soon after arriving in England, I presented a memorial \* to the Board of Admiralty, proposing such means for the preservation of the health of the fleet as had occurred to me during my past service.

The Board of Admiralty considered this memorial with all the attention that could be expected in the general hurry of service, inseparable from a great and extensive war; and I am happy in being able to say, that, in consequence of my application, most of the particulars recommended have since been so far carried into effect as to produce a practical conviction of their utility.

Lord Rodney having recovered his health, hurried out to his station with all the force that could then be equipped, as the enemy were expected at the Caribbee Islands, with a superior force, after their successes against us in the autumn campaign in America.

I had again the honour to accompany the Admiral. He first sailed from Portsmouth,

\* See Appendix to Part II.

with

with four ships of the line, on the 14th of December, and was to have been joined by two more that lay ready at Plymouth; but by the time we arrived off this harbour the wind became contrary, whereby we were detained there till the 14th of January, 1782. During this time more ships were got ready, and six were added to the squadron; for the public anxiety at that time called forth every exertion to strengthen this reinforcement, upon which the fate of the whole West Indies was supposed to depend.

This fleet cleared the Channel in the midst of a storm, and with the wind at the same time so scanty, that we barely weathered Ushant; but Lord Rodney's perseverance and resolution, stimulated by the exigency of the occasion, banished all hesitation and timidity. The rough weather, and contrary winds, continued through the variable latitudes; but having met with fresh blowing trade winds, common at that season, we had the good fortune to get safe to Barbadoes with the whole squadron on the 19th of February.

All the twelve ships \* of this reinforcement had been on service for a considerable length of time since they had been last commissioned, except the Anson, a new ship, which had never before been at sea, and the Fame and Yarmouth, which had lately undergone a thorough repair, since which time they had been only for a few weeks at sea in the Channel before they were ordered on this service.

The only ship that was sickly when we left England was the Fame, on board of which some pressed men, with the infection about them, had been received from the Conquestadore guardship; and the fever which broke out in Plymouth Sound, where I was first sent for to visit that ship, was probably owing to the infection which these men brought with them. The other ships were, upon the whole, healthy, for it appeared by the weekly accounts delivered to the Admiral, that the mortality, including even that of the Fame, for the four weeks

\* They were the Formidable and Namur of 90 guns; the Arrogant, Conqueror, Marlborough, Hercules, and Fame, of 74 guns; the Yarmouth, Repulse, Prothée, Anson, and Nonfuch, of 64 guns.

before



before we sailed, had been only one in thirteen hundred, and that there had been about one in twenty-nine on the sick list.

An opportunity offered on this occasion of comparing the health of ships of war in England with that in the West Indies. The health of the fleet in general at home was at this time about the proportion above mentioned; but it is to be remarked, that it was healthier then than in the former part of the war.

Plymouth hospital, which is calculated for twelve hundred men, was not half full; and there were not at this time more than six hundred men at that of Haslar, at which the sick of the ships at Portsmouth are received, and which is calculated to contain two thousand; but the latter was generally full during the first two or three years of the war, from the great fleets that put into this harbour. At one time part of the sick were even obliged to be accommodated with tents in the neighbourhood of the hospital, for want of room. But towards the end of the year 1781 the infectious fever, which constitutes a great part of the sickness  
in

in the European seas, was almost extirpated; and in a cruise of five weeks in the north part of the Bay of Biscay, under Admiral Darby, in September and October of this year, only six men were buried in that time from twenty-eight ships of the line.

This was chiefly owing, as I apprehend, to the length of time which the war had continued, in consequence of which the men of the respective ship's companies had been accustomed to each other, and habituated to the mode of life peculiar to a man of war, regulating themselves according to certain rules of good order and cleanliness. The causes of the fever above mentioned, as shall be more fully illustrated hereafter, are chiefly connected with the circumstances occurring in the beginning of a war, when men of all descriptions are mixed, without proper precautions being taken to guard against the infection imported from jails or guardships. The sickness in the French fleet was still greater in the beginning of the war than in the British; and this has been the case in all the wars of this century. In the fleet commanded by the Comte d'Orvilliers, in 1779, the sickness was so great  
as

as to disable many of the ships from service, and great numbers of men were landed at Brest, with a fever so malignant as to infect the inhabitants of the town and of the adjacent country. I believe, besides, that the general health prevailing at this time in the fleet in England, was, in part, owing to the four crout and melasses, which were now supplied more amply than had ever been done before. The entire exemption from scurvy in particular is to be ascribed to these improvements in diet.

There is a tendency in acute diseases to wear themselves out, both in individuals that labour under them, and when the infection is introduced into a community. Unless there was such a *vis medicatrix*, there could be no end to the fatality of these distempers; for the infectious matter would go on multiplying itself without end, and would necessarily destroy every person who might be actually attacked, and would infect every person who might be exposed to it. But animal nature is so constituted, that this poison, after exciting a certain series of motions in the body, loses its effect, so that recovery takes place; and those who happen  
not

not to be infected at first, become in some measure callous to its impression, by being habitually exposed to it. There is, therefore, a natural proneness to recovery, as well with regard to that indisposition which takes place among a set of men living together, as with regard to a single individual who actually labours under the disease. Thus the most prevailing period of sickness is when men are new to their situation and to each other, so that time of itself may prove the means of prevention as well as of cure.

This consideration, however, ought not to supersede any part of our attention with regard to the scurvy, which does not become spontaneously extinct like acute diseases,

During the three first weeks of this passage from England to the West Indies, there was wet and boisterous weather, but it had very little effect in augmenting sickness; and though it not only subjected the men to fatigue, cold, and damp, but prevented the ships from opening their lower-deck ports till the 2d of February, between the 31st and 32d degree of latitude, thereby pro-

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ducing close air and moisture where the men sleep, yet, in the whole squadron, from its leaving England till this time, there were only seven deaths, four of which were in the *Fame*.

The only sea epidemic that made its appearance was the infectious ship fever, which, in many cases, was attended with pleuritic, rheumatic, and other inflammatory symptoms, owing to the cold and wet, to which the men were exposed in the variable latitudes. The warm, dry, fresh breezes which we had during the remainder of the passage, were probably what prevented any bad consequences from the former hardships, for there died only four men from the above-mentioned date till we arrived at Barbadoes; and it appeared by the Admiral's weekly account, that the proportion of the sick neither increased nor diminished from the time we got into a warm climate and fine weather till our arrival on the 19th of February.

This squadron left England with several advantages in point of victualling, which no ships had before enjoyed. They were amply  
supplied

supplied with four crout and melaïsses; they had all more or less wine, of an excellent quality; and the Formidable had an entire supply of it, in place of spirits, of which none was put on board. This ship had hitherto, and did for some months afterwards, enjoy an extraordinary, perhaps an unparalleled, degree of health. What farther contributed to the health of this ship was, that she had been long in commission, and most of the recruits with which the crew had been completed were men turned over from other ships. There was also extraordinary medical attention paid, particularly in watching the first beginnings of complaints.

Upon the arrival of the squadron at Barbadoes, it was found, that, the two hostile fleets having returned from North America in the beginning of December, the campaign had opened with the siege of St. Christopher's, which had been invested by twenty-eight ships of the line, and a considerable army. Our fleet, under Lord Hood, having attempted, without success, to relieve this place, Lord Rodney made haste to join it with the reinforcement he had brought

from England. He remained at anchor at Barbadoes only one night, and in a few days came off Antigua, where he was informed of the surrender of St. Christopher's; and here, on the 25th of February, he was joined by the rest of the fleet in their return to windward.

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## C H A P. II.

**T**HE fleet which was found in the West Indies consisted of all the sixteen that went from thence to America in August, 1781, (except the Terrible, which had been lost) together with six ships of the line \* from the American station, the St. Albans, which arrived from England in November, and the Ruffel, which had remained in the West Indies during the hurricane months. They were all extremely healthy, having only one man in twenty-eight on the sick list, and very few had been sent to hospitals.

\* These were the Prince George, of 90; the Bedford, Canada, and Royal Oak, of 74; the America and Prudent, of 64 guns.

This

This fleet, after arriving from America, had lain at anchor for three weeks at Barbadoes, where it had the advantage of the vegetable refreshments which that island affords ; but during three weeks that it lay at anchor, in the face of the enemy, at St. Christopher's, the men were excluded from all communication with the shore, and had no vegetable food, except some yams, with which they were supplied from Antigua, in place of biscuit, of which there was at this time a scarcity. These ships had therefore been in no port for six weeks, except for a few days that they lay in the road of Antigua refitting, and putting the sick and wounded on shore.

The men had also been deprived of their natural rest, and exposed to the air during all the time that the fleet was at anchor before St. Christopher's ; for they had been twice attacked by the enemy in that situation, and were therefore under the necessity of keeping the ships constantly clear for action ; yet no increase of sickness followed. This might partly be owing to the eagerness and alacrity of spirits naturally excited in such a situation, and also to the fleet not lying

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under



under the lee of any land, and having springs upon their cables, in order to oppose their broadsides to the enemy in one line, so that they had all the perfusion and all the purity of air which ships enjoy when at sea. The fumigation which ships undergo in battle, has also been thought to contribute to their health.

To whatever cause it was owing, the fleet we found in the West Indies was at this time healthier than that which had just come from England; and there was but little difference in the degree of health of the different ships that composed it. Of those which left the West Indies in August, and returned in December, the only one that could be said to have any epidemic disease was the Prince William, which had never got entirely free from the dysentery that was formerly mentioned as prevailing so much on board of this ship last year. This disease was kept up, by the ship never having been cleared of the men affected with it, and by the crew in general being ill provided with slops \*, a circumstance that would render

\* This is a term in use for the different articles of seamen's cloathing, particularly shirts and trowsers.

them

them more susceptible of whatever infection they might be exposed to. It has been doubted whether the dysentery is infectious, but the facts stated here and elsewhere in this work afford abundant proofs of this.

There were also some remains of the same disease in the *Intrepid*, the seeds of it having been more or less continued from the summer of 1780, at which time it prevailed to a most violent degree. The *Alfred* had a few of all the sea epidemics, and had been for a long time before more or less in the same situation, from a neglect of cleanliness, particularly of the men's persons.

The only ship in which there was any thing like an epidemic was the *Canada*. This ship, when at home, had for many months before she sailed been in unremitting service, and very little in port. On the passage from England to America, in August 1781, there broke out a severe dysentery, to which the scorbutic habit of the men, from being so long at sea, probably pre-disposed them. Though it had abated much

in February, 1782, it was then by no means extinct, and continued till April. The Prince George had been in commission all the war, and was a model of discipline and cleanliness, and consequently of health. This continued till the passage from America, when, upon the first cold weather after leaving New York, there broke out a violent dysentery, of which sixteen men died. This is agreeable to what Dr. Lind observes, that the flux may be brought on by a sudden transition, either from cold to heat, or from heat to cold. All the men that were ill of this disease having been sent to the hospital at Barbadoes, and the usual attention to cleanliness having been kept up, the disease entirely disappeared.

All the other ships of the American station had been more or less visited with sickness after they left England, except the Bedford. This was probably owing to this ship having been longer in commission than any of the others, that is, for four years, and all that time under the same commander. This last circumstance falls to the lot of few ships; but a great advantage attends it; for the  
mutual

mutual knowledge and attachment of the captain and ship's company is naturally productive of regularity and good discipline, and thereby of health; and it is farther conducive to the same end, that there is no occasion for the introduction of strangers.

The Royal Oak, Prudent, and America, which left England with the Bedford, though they had been afflicted with the scurvy and other complaints soon after arriving in America had been quite healthy for some time before coming to the West Indies, and were so much so at this period, that, though there were a few sores and slight complaints on their sick lists, there was not a man so ill as to be confined to bed. The Royal Oak, having been the flag ship of Admiral Arbuthnot, was manned with choice seamen, which is a circumstance generally conducive to health; for these being accustomed to a sea life, are more provident, more handy and methodical in all that relates to diet, cloathing, and cleanliness. The scurvy, which infested her upon first arriving in America, was successfully treated on board by serving to those who were ill of it a mess, composed of soft bread, baked



baked on purpose, and mixed with wine and essence of malt.

The Prudent, though now quite healthy, had been sickly soon after being put into commission in Europe, and upon first arriving in America. She had been uncommonly sickly, when a new ship, upon her first voyage, which was to the East Indies, during the peace. This remarkable degree of sickness was probably owing to a particular experiment that was made in preparing the wood of which she was built. This experiment consisted in soaking the timber for a length of time in a strong pickle, in order to make it less corruptible. The only other ship on which the trial of this was made was the Intrepid ; and it has been already mentioned that this was an extremely sickly ship. The effect of it upon the wood was to cause a constant moisture and mouldiness in the orlops and holds. In the Intrepid, the sickness was never conquered till a practice was followed of pumping and bailing her with great care, and putting a fire into the well for six hours every day, by which means the dampness, and the mildew produced by it, were removed and prevented

prevented, and the ship thereby rendered healthy.

The two squadrons being united, and consisting of thirty-four ships of the line, proceeded to St. Lucia, where they arrived on the 1st of March.

I received monthly returns as formerly, and the form of them was improved by adding a column for the numbers taken ill of the several diseases in the course of the month. The returns of February are not complete, there being none for the 1st of that month, as we had not then arrived; but as the returns of the 1st of March have relation to the preceding month, a judgment may be formed of the sickness and mortality of February from the following table:

ABSTRACT

# ABSTRACT OF the RETURNS of the 1st of March, 1782.

DISEASES.	Put on the Sick List last Month.	Died last Month.	Sent to the Hospital last Month.
Fevers - - -	553	15	9
Fluxes - - -	263	67	0
Scurvy - - -	121	2	5
Other Complaints	618	25	59
Total - - -	1,555	109	73

This account is abstracted from the returns of twenty-nine ships of the line, and two frigates.

The diseases and deaths under the head of "Other Complaints," is much more numerous in this month than usual, which is chiefly owing to the preceding actions with the enemy, and to the prevalence of the small pox. Of the deaths under this head, seventeen were in consequence of wounds,  
fix

six from small pox, one from a mortification \* in the shoulder, and one from consumption.

None of the epidemics affected one part of the Squadron more than another, except that the ships last from England had a less proportion of the flux than the rest; and the few cases of this disease that were in these ships arose after their arrival in the climate. The Conqueror and Fame, which were the two most sickly ships, had no complaints but fevers.

The fevers had now begun to take on some of the characteristic symptoms of the climate; the chief of which is a greater abundance of bile. In the Repulse, two men had the yellow colour of the skin, which is so peculiar to the fevers of this climate.

\* The mortification in the shoulder, mentioned above, was somewhat singular. It happened to a man in the Yarmouth, who, after being for a week ill of a fever and flux, was one day, early in the morning, seized with a pain in the upper part of the right arm, which immediately began to mortify. He soon after became convulsed, and died the same day about two o'clock.

The



The crew of the *Anson* caught an infectious fever from a guardship in England; and when the *Prothée* sailed, there was a fever of the same kind on board; but from the change of climate, the symptoms became milder, and the disease disappeared in both these ships in the course of this month.

The small pox prevailed more at this time in the fleet than I have ever known it to do either before or since, and that both in the squadron from England and in that from North America. There were six cases in the *Formidable*, all of which did well, though two were of the confluent kind.

Though there needs hardly any additional proof of the extraordinary efficacy of lemon juice in curing the scurvy, yet it may be of service to impress so useful a truth on the mind by mentioning such striking proofs of it as occurred from time to time. The *Arrogant* spoke with a Portuguese vessel near Madeira, from which some of this fruit was procured, and the only scorbutic man on board happening to have some of the most  
desperate

desperate symptoms, such as putrid gums, contracted hams, the calves of the leg hard and livid, and frequent faintings, a fair opportunity offered for trying its virtues. This man was allowed two of them daily, and was perfectly well in sixteen days, during all which time the ship was at sea, so that it was impossible to ascribe the cure to any other cause.

The fleet remained at St. Lucia from the 1st till the 18th of March, completing the water, provisions and stores, landing the sick at the hospital, and also watching the motions of the enemy, who arrived about the same time at Martinico from the siege of St. Christopher's. During this time we were reinforced with the Duke, of 90 guns, and the Warrior and Valiant, of 74 guns, from England. On the 18th the whole fleet, except the Invincible, which was detached with a convoy to Jamaica, failed on a cruise to windward of Martinico, in quest of a French convoy expected from Europe; which having eluded us, and got into their own harbour, the whole fleet returned to St. Lucia on the 30th of March, excepting the Prudent, which was sent to Barbadoes.

We found at St. Lucia the *Magnificent*, of 74, and the *Agamemnon*, of 64 guns, which were the last reinforcement of this campaign, making the British fleet on this station amount to forty ships of the line, a much greater force than was ever before employed on foreign service. They were all sheathed with copper.

The weather continued fine all this month, yet there was some increase of sickness, owing chiefly to the hardship the men underwent in wooding and watering. In Choc Bay, where the fleet watered, there was at this time a higher surf than was ever remembered, which made the operation of watering (at all times noxious in this climate) uncommonly toilsome and dangerous. It was, indeed, next to impracticable; for many longboats were staved on the beach, by which several men had their limbs broken, and some lost their lives, by being crushed or drowned; but the necessity of the service admitted of no relaxation or delay. There was no increase of wind to account for the surf, so that it was owing either to something in the currents, to high winds to windward, or to some subterraneous

neous cause. There had been felt at Barbadoes and St. Lucia, about this time, a slight shock of an earthquake \*, to which many imputed this extraordinary surr. In other

\* Earthquakes are frequent in the West Indies, and perhaps proceed from a weaker operation of the same cause that originally produced the islands themselves, which seem all to have been raised from the sea by subterraneous fire. There are evident vestiges of volcanoes in them all, except Barbadoes; but there are other unequivocal marks of this island having been raised from the bottom of the sea; for it is entirely formed of coral, and other sub-marine productions, of which the strata are broken, and the parts set at angles to each other, as might be expected from such a cause. There is, perhaps, at all times more or less † ignited substances in the caverns of the earth, converting water into elastic vapour, which, struggling to vent itself, may sometimes shake or even overcome the incumbent masses of matter, and produce earthquakes and volcanic eruptions. In the account of the hurricane which I wrote to Dr. Hunter, I gave reasons for believing, from the testimony of the inhabitants, that hurricanes are attended with earthquakes; and if a conjecture might be advanced concerning the cause of this, it might be said, that as the atmosphere is lighter at that time, by several inches of the barometer, the elastic vapour, confined by the weight of the incumbent earth and atmosphere, being less compressed, may exert some sensible effects, producing a sort of explosion.

† See an ingenious Essay on this subject, by the Rev. Mr. Mitchell.—*Phil. Transf. Vol. I.*

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respects, there were fewer causes of sickness than usually occur to a fleet in port in this part of the world; for the air of the road is remarkably pure, and there were fewer temptations and opportunities of intemperance than at the other islands.

The monthly returns of the surgeons were very full and complete; but as it would be tedious to insert at length those of every particular ship, and as the number of ships fluctuated in different months, I shall do no more hereafter than set down the general results from calculation, so as to shew the proportional prevalence of disease and mortality in each month.

TABLE, shewing the proportional Sicknefs and Mortality in March.

D I S E A S E S.	Proportion of thofe taken ill in the Courfe of this Month.	Proportion of thofe who died, in relation to the Num- bers of the Sick.
Fevers - - -	20	64
Fluxes - - -	35	71
Scurvy - - -	126	0
Other Complaints	33	108
General Proportion	9	76

The first column is formed by dividing the whole number on board by the number taken ill. The second column is formed by first adding the number ill on board on the first of the month to the number taken ill during the month, subtracting from this sum the number sent to the hospital, and dividing the remainder by the number of deaths.

The number on the sick list of twenty-eight ships of the line, and two frigates, on the first of this month, was eight hundred and forty-five; the number put on the lists in the course of the month was one thousand eight hundred and eighty-four; and the number sent to the hospital in the same time was three hundred and seventy-three; and there died on board thirty-one.

The total mortality this month, in relation to the whole number of men on board, was one in six hundred and seven.

It almost always happens, that ships of war are more or less short of complement, but all the calculations are made by the exact numbers on board; for having had an opportunity of inspecting the weekly accounts delivered to the Admiral, it was always in my power to be informed how many there were short of the legal complement of men in each ship.

It appears, from comparing the Tables of this month with those of the preceding, that there had been a great increase of fevers and fluxes, particularly of the latter. The fevers prevailed chiefly in the ships  
lately

lately from England, especially the *Fame* and *Conqueror*. In the *Duke* there was a great number ill of fevers; but this ship not having arrived from England till after the first of the month, is not included in the calculation. The fluxes were most prevalent in the ships we found on the station, particularly the *Canada*, *Resolution*, and *Nymph* frigate. The scurvy had increased very little, but prevailed most in the ships we found here. The only ships of the new squadron that had this disease to a considerable degree, were the *Conqueror* and *Nonfuch*. The former had indeed a good many ill of it; but the return having been made in an imperfect manner, this ship is not included in the calculation.

But the ships that were by far the most healthy were those that had been the longest from England, the *Ajax*, *Russel*, *Montague*, *Royal Oak*, and *Prudent*. There had been formerly a great mortality in all these ships; and it would appear that this uncommon degree of health was owing, in some measure at least, to this circumstance, that the more delicate had been swept off by the different distempers to which they were



exposed; so that only the more hardy and robust had survived.

Under the head of "Other Complaints," a much smaller number were put on the list, and still fewer died in this than the preceding month. This difference is owing to the number that died of wounds last month.

There died on board, in the course of this month, thirteen of fevers, seven of fluxes, and seven of other complaints, of whom five died of small-pox, one of asthma, and one of wounds he received at St. Christopher's.

In order to show more fully and minutely what are the complaints incident to fleets in this climate, I shall set down a list of the numbers taken ill of the different diseases and accidents during this month, extracted from the returns of twenty-eight ships of the line and two frigates.

Fevers - - -	806	Dropſy - - -	1
Fluxes - - -	463	Ophthalmia - -	1
Scurvy - - -	130	Leproſy - - -	1
Ulcers - - -	129	Fiſtula in ano -	3
Small-pox - -	49	Hernia humoralis	1
Rheumatifm -	18	Absceſs - - -	1
Pectoral com- }		Fractures - - -	3
plaints - }	40	Various flight	
Venereal com- }		accidents, as }	
plaints - }	32	bruifes, cuts, }	163
Colds - - -	30	ſcalds, &c. }	
Angina - - -	10		
Gravel - - -	3	Total -	1,884

The number of ulcers bears here a ſmaller proportion than it does in general to the ſum total of the ſick liſt; for being the moſt tedious of all complaints, they conſequently accumulate more than any other. Thus many of the caſes now ſet down as flight accidents, will, in the enſuing month, be in the ſtate of obſtinate ulcers.

Moſt of the diſeaſes of one hot climate reſemble thoſe of another, ſo far as I know; but there is one diſeaſe which we hear of as being extremely prevalent all over the Eaſt Indies, which is hardly ever met with in the tropical regions of the Weſt. This is

the inflammation of the liver, of which I remember to have seen only one well-marked case, and it was that of a gentleman who had been in the East Indies, and had been subject to it there: nor do I recollect more than one, or at most two, cases of this sort out of several thousand cases of various diseases that were reported to me. This is either owing to the greater heat and dryness of the air in the East Indies, or some other peculiarity with which we are not acquainted \*

Every other inflammatory complaint exists more or less, though they are much rarer than  
than

\* Since the publication of the first edition of this work, I have been informed that this complaint is not so rare on shore as in the fleet; which may be partly owing to the greater coolness of the air at sea, and partly from the seamen not having been a sufficient length of time in the climate to be affected with this disease, as few of them had been more than two years from England. But as this affection of the liver was very common in the fleets and naval hospitals in the East Indies, it is evident that it differs materially in this respect from the tropical countries of the West. It is worth remarking, that it sometimes breaks out in the West-India Islands like an epidemic. The complaint, for instance, was very little known in the island of Grenada, till about the year 1785, when

than in cold and temperate climates. The phthisis pulmonalis is not so common as in cold climates, but proves sooner fatal to most constitutions. There are certain pulmonary complaints, particularly those of the asthmatic kind, to which the climate of the West Indies is remarkably favourable; but those in which there are tubercles and ulceration, seem to be hurried faster to a fatal termination. The climates, from the thirtieth to the fortieth degree of latitude, seem to be best suited to consumptive complaints. The rheumatisms that occur in hot climates are mostly of the chronic kind.

when it became very frequent in a particular quarter of the island; and the gentleman who sent the description of it to England alledged, that there were the most unequivocal proofs of its been contagious. It was most successfully treated by very copious bloodletting, and in exciting a salivation by mercury. See Dr. Duncan's Medical Commentaries, Decad. 2, vol. I.



## C H A P. III.

THIS month being interesting, on account of the memorable engagements that happened in it, the remarks shall, for this reason, be somewhat more full and particular.

Three ships of the line having been sent to protect convoys to Jamaica, and one having been sent to protect a convoy to Barbadoes, there remained thirty-six at St. Lucia in the beginning of this month. By the end of the first week their damages were repaired, their water and provisions complete, and the sick in a great measure recovered.

An equal force of the enemy lay over against us at Martinico, the two powers of Britain and France being to make this distant quarter of the world the theatre for trying their strength, and deciding the sovereignty of the seas. In the view of this great event, our commander forwarded the necessary duties of the fleet with such zeal and diligence, and watched the motions of the enemy with such



# T A B L E V.

## ABSTRACT of the RETURNS for APRIL, 1782.

SHIPS' NAMES.	FEVER.				FLUX.				SCURVY.				WOUNDS.			
	Sick on board on the 1 <sup>st</sup> of the Month.	Put on the List during the Month.	Dead.	Sent to the Hospital.	On board on the 1 <sup>st</sup> .	Put on the List.	Dead.	Sent to the Hospital.	On board on the 1 <sup>st</sup> .	Put on the List.	Dead.	Sent to the Hospital.	On board on the 1 <sup>st</sup> .	Put on the List.	Dead.	Sent to the Hospital.
* Formidable - -	0	6	0	1	2	7	0	0	0	5	0	0	0	37	0	0
Barfleur - - -	6	20	0	1	5	13	0	1	6	30	0	1	0	37	8	6
Prince George -	0	12	2	1	4	18	1	0	0	7	0	0	0	24	3	0
* Duke - - -	57	78	2	32	0	3	0	0	0	1	0	0	0	60	2	0
* Namur - - -	5	14	0	2	11	9	0	3	8	5	0	2	0	25	0	0
Royal Oak - - -	1	4	0	0	11	23	0	3	1	1	0	1	0	54	5	15
Alfred - - -	8	46	1	0	6	14	0	0	15	14	0	2	0	30	0	0
Montagu - - -	6	11	0	0	8	2	1	5	2	2	0	0	0	25	5	0
* Valiant - - -	§	10	1	0	§	0	0	0	§	0	0	0	0	37	0	0
Monarch - - -	5	21	1	0	3	10	0	1	0	1	0	1	0	33	2	1
* Warrior - - -	0	2	0	0	6	12	0	0	0	0	0	0	0	20	0	0
Centaur - - -	12	20	0	1	10	15	0	1	5	15	0	0	0	14	0	0
* Magnificent -	0	21	0	0	0	8	0	0	7	16	0	0	0	20	0	0
Bedford - - -	11	20	0	0	3	27	0	0	1	10	0	0	0	17	4	0
Ajax - - -	0	0	0	0	0	0	0	0	0	0	0	0	0	30	1	5
Canada - - -	0	6	1	6	24	70	2	0	2	8	0	0	1	12	0	0
Resolution - -	19	25	1	0	21	27	0	0	0	0	0	0	0	19	2	0
* Hercules - -	2	38	0	4	5	18	0	0	0	12	0	2	0	18	0	0
Ruffel - - -	3	3	0	0	5	4	0	0	0	1	0	0	4	29	3	1
* Fame - - -	36	50	0	0	3	8	1	0	0	7	2	0	1	12	2	0
Torbay - - -	10	10	0	0	9	2	0	0	3	2	0	0	0	25	3	0
Princessa - - -	1	2	0	0	2	8	0	3	0	0	0	0	0	19	2	0
* Conqueror - -	30	§	1	11	0	§	0	0	10	§	0	0	0	23	2	0
* Arrogant - -	2	16	0	0	6	33	0	0	4	10	0	0	0	11	0	0
* Marlborough -	7	19	2	0	12	21	1	0	0	6	0	0	0	16	1	1
* Yarmouth - -	0	3	0	0	4	3	0	0	3	3	0	0	0	33	2	0
Belliqueux - -	43	118	0	0	6	4	0	2	0	3	0	0	0	10	0	0
Prince William	4	27	0	0	2	24	0	0	5	18	0	0	1	0	0	0
* Repulse - -	20	40	0	0	2	2	0	0	3	2	0	0	0	9	1	0
St. Albans - -	1	22	0	0	0	6	1	0	0	0	0	0	0	7	1	0
* Agamemnon -	2	5	0	0	0	1	0	0	0	0	0	0	0	23	7	0
* Prothée - - -	6	13	1	0	5	49	0	0	0	0	0	0	0	24	2	0
America - - -	2	5	0	0	3	14	0	0	2	0	0	0	1	27	2	0
* Anfon - - -	3	6	0	0	0	26	0	0	1	1	0	0	0	13	0	0
* Nonfuch - - -	6	11	1	0	0	4	0	0	18	25	0	6	0	2	0	0
Alcide - - -	2	6	0	2	7	16	0	0	7	0	0	0	0	15	0	3
Ramillies - - -	§	26	1	4	§	6	0	0	§	3	0	3				
Nymph - - -	2	7	0	0	8	9	0	0	0	0	0	0	0	0	0	0
Flora - - -	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Total - - -	312	743	15	65	195	516	7	19	103	208	2	18	8	810	60	32

N. B. The Ships marked thus, \* came from England in February and March, 1782.

All the Ships named in the Table were in the Engagements in April, except the Ramillies and the two Frigates.

In the Spaces marked thus, §, no Return was made.

such vigilance, that he overtook their grand Squadron a few hours after they left their own port, and engaged them two several days, with a success, glorious and complete.

Nothing had been wanting to equip this fleet for the great and decisive exertion it was to make. Every ship, except two, might be said to be healthy, most of them were complete in men, well appointed with officers, and well found in stores and provisions.—Conformable to this was the eagerness, the confidence, and resolution, which led them to success and victory.

After this battle, the whole fleet, with the prizes, bore away for Jamaica, where part of it arrived on the last days of April, but the greater part of it kept the sea till after the middle of May.

As this month is more than usually interesting, the tables are given at full length, and a column is added for the wounded.

The sum total, of the numbers of the men on board of the thirty-six ships that composed the line of battle on the 12th of April,  
was



was 21,608, and the mortality during the month, exclusive of those who were killed or died of wounds, was one in 862.

There was less sickness, and less death, from disease in this month, than any of the former twenty-three months, in which I kept records of the fleet, and less than in any subsequent month, till the fleet got to the coast of America.

To account for this, it is to be observed, that the men had not been exposed to the noxious air of the shore in watering, as in the preceding month: they had received from England a fresh supply of provisions, among which was four krout, melasses, and essence of malt, all in addition to the ordinary articles of victualling: many of the ships were supplied with wine in place of rum, and as the weather was all along dry and fine, the men suffered the less from the exposure and want of sleep, which are the necessary consequences of keeping ships clear for battle for several days and nights together.

Might

Might not this extraordinary degree of health have also been owing, in part, to the effects of success upon the spirits of the men? It is related \*, that, when the fleet under Admiral Matthews was off Toulon, in daily expectation for some time of engaging the combined fleet of France and Spain, there was a general stop put to the progress of disease, particularly of the scurvy, from the influence of that generous flow of spirits, with which the prospect of battle inspires British seamen. But if the mere expectation and ardour of a battle, without any happy event, could have such a sensible effect, what must have been the effect of the exultation of VICTORY, a victory in which the naval glory of our country was revived and retrieved, after a series of misfortunes and disgraces, which had well nigh extinguished the national pride in every department of service! The plain and honest, though unthinking seaman, is not less affected by this than the more enlightened lover of his country. Even the invalids at the hospital demonstrated their joy, upon hearing of this victory, by hoisting shreds of coloured cloth on their crutches.

\* Dr. Lind, on the authority of Mr. Ives, surgeon to Admiral Matthews.

It would appear, that there is something in situations of exertion and danger, which infuses a sort of \* *præternatural* vigour. When the mind is interested and agitated by active and generous affections, the body forgets its wants and feelings, and is capable of a degree of labour and exertion, which it could not undergo in cold blood. The quantity of muscular action employed in fighting at a great gun for a few hours, is perhaps more than what is commonly employed in a week in the ordinary course of life, and though performed in the midst of heat and smoke, and generally with the want of food and drink, yet the powers of nature are not exhausted nor overstrained; even the smart

\* What is here called *præternatural*, may have been taken for *supernatural* by unenlightened minds and heated imaginations, and when we reflect on the real encrease of natural strength produced by ardour of mind, we can excuse that superstitious illusion which attributes it to the secret agency of some propitious invisible power. This sentiment, which so strongly influences the human character and conduct, is plainly implied in the etymology of the word *enthusiasm*; and the consciousness of this encreased vigour of mind and body, exalted by the belief of its divine origin, will serve to account for the astonishing efforts of this principle which are met with in the history of mankind, and which have effected ends unattainable by ordinary motives of action.

of wounds is not felt ; and the future health of those who survive unhurt by external violence is so far from being injured, that it is sometimes mended by this violent, but salutary agitation.

The loss in action, and the number of mortal wounds, were not so great as might have been expected in a battle continued for a whole day. This advantage was owing to the superiority of our fire, as well as to the closeness of the fight, of which the Commander in Chief set the illustrious example, by penetrating the enemy's line with his own ship; a bold and singular effort which first decided the event of the day. When ships in action are opposed to each other at a small distance, the velocity of cannon balls is so great, that in penetrating a ship's side, few or no splinters are torn off; and by these more men are commonly killed and wounded, than by the ball itself. For the same reason, a close shot does less damage also to the ship itself, than a distant one; for a quick-flying ball makes an aperture less than its own diameter, whereas a spent one produces innumerable deadly splinters, at the same time shivering the object



ject it strikes, and making wide and extensive rents in it. The proportion of the wounded to the killed, is also greater in distant than in close fight, on account of the great number of small splinters; and we have an experimental proof of this, in comparing the action in Fort Royal Bay in April 1781, with this near Dominica in April 1782. In the former, the enemy having kept far to windward, and engaged at a great distance, the proportion of the wounded to the killed was considerably more than four to one\*; whereas in the latter, where the greater part of the battle was close, the proportion of the wounded to the killed, was little more than three to one†.

\* London Gazette, *June*, 1781.

† This is well illustrated by the manner in which Captain Nott, of the *Centaur*, was killed in Fort Royal Bay. This brave man, having carried his ship nearer the enemy than the rest of the line, but nevertheless at a great distance, had his signal made to keep the line, and having gone into his cabin, as it is said, to examine the import of the signal, a cannon ball struck him in the groin, and it was so far spent that it stuck in his body. It tore away a whole plank of the ship's side, the splinters of which killed a young gentleman, the only person near him.

Though

Though it is a remark not belonging to a medical work, yet it may be observed, that the greatest advantage that arose to us from close action was, that the fire of the enemy was thereby silenced; for the advantages would be mutual and equal, on the supposition, that the French, in such a situation, were to keep the deck, and stand to their guns equally well with the British seamen,

It appears, by examining the table, that the ships in which the fevers chiefly prevailed this month, were those that came last from England, and that those in which the fluxes prevailed most were chiefly of the squadron we found on the station, namely, the *Canada*, *Resolution*, and *Prince William*. The latter however recovered greatly in the course of this month. Some of the Ships that arrived last from England, namely, the *Arrogant*, *Prothée*, and *Anson*, were also considerably afflicted with fluxes, but they were of an extremely mild kind; and the small number of deaths from this disease in comparison with those from fevers, is a proof of a former observation, that this is the safest form in which an acute disease can shew itself. This small degree of mortality was also owing to

G

the

the judicious method of treating it which was in general practised throughout the fleet; and it is but justice to the medical gentlemen to say, that they shewed on this, as well as every other occasion, great skill and attention in the treatment of the sick and wounded.

The sum total of fevers and fluxes that have been put on the list this month, is much the same as that of the preceding month; but the proportion of fluxes in April is much greater.

The proportion of scurvy is somewhat increased; which is not to be wondered at, when it is considered, that though the fleet had not been so long at sea as is necessary to produce it, especially in this climate, yet the men having had no refreshments when last in port, may be considered as having been all that time at sea.

The superior degree of health in this month will appear in a still stronger light, if we cast our eye on the column expressing the number sent to the hospital, the proportion of which is, comparatively, very small.

The

The ships that had been the longest from England, were still among the most healthy. But of all the fleet, none was so free from sickness and mortality as the Formidable. No man belonging to this ship died of disease for the first four months after sailing from Plymouth, though there were at times 900 men on board, and never less than the established complement, which is 750; and so few were taken sick in that time, that only thirteen were sent to hospitals, and their complaints were small-pox and ulcers.

This ship left England provided with every thing that could be supposed to conduce to the health of men, and may be considered as an experiment to prove what degree of health may be attained by proper management and attention. She was furnished not only with abundance of four krout, melasses, and essence of malt, in common with the other ships; but what was peculiar to her, was an entire supply of excellent wine, in place of spirits, of which none was used during the period mentioned.



## C H A P. IV.

**A**L L the squadron that was left to windward of Jamaica, consisting of twenty-four ships of the line, kept the sea during great part of May, the last division of it not having come to Port Royal till the 25th of that month.

The whole fleet remained in harbour during the remainder of the month, and the whole of the next, except the Warrior, Prothée, and Russell. The two former were sent on a cruise, in which the Warrior continued quite healthy, as she had been ever since her arrival from England; and in the Prothée a great check was given to the fevers and fluxes which had begun to prevail at Port Royal. The Russell was sent to England with a convoy.

TABLE, shewing the proportional Prevalence of Sicknefs and Mortality in May.

DISEASES.	Proportion of those taken ill or wounded in the Course of the Month.	Proportion of those that died in relation to the Numbers of Sick or wounded.
Fevers - - - - -	26	29
Fluxes - - - - -	18	63
Scurvy - - - - -	57	34
Wounds - - - - -	627	60
Other Complaints - -	44	127
General Proportion, } including wounded }	7½	46
General Proportion, } exclusive of Wounds }	8	48

The whole number of sick on board on the first of this month, in thirty-six ships of the line and two frigates, upon which the preceding calculation is formed, was one thousand four hundred and eighteen. The

whole number taken ill in the course of the month was two thousand eight hundred and twenty-eight; the number sent to the hospital was one hundred and seventy-three; and there died on board ninety-four.

The proportion of those who died this month, in relation to the whole number on board, was one in two hundred and eighty-seven.

There was a considerable increase of sickness and mortality this month in all the common diseases, and chiefly in that part of the squadron which was in port. There was less increase in the number of fevers than either of the other two epidemics; but such was their increased malignancy, that more died of them than of both the others. The number of fluxes was more than double of what it was the preceding month, and the mortality from them was also in a much greater proportion, as may be seen from the Tables.

The fevers prevailed chiefly in port, and the fluxes at sea. A good many of the latter, indeed, arose in the Alcide, though constantly

constantly in port ; but this seemed to be owing to contagion conveyed by some British soldiers, who were sent on board of this ship after being retaken in one of the French men of war, several of whom were ill of this disease. But there were few fluxes in those ships at Jamaica in which the most malignant fevers appeared. There were a few in those in which the fevers arose from the air of the marshes on the watering duty ; but there were none on board of the French prizes, nor in those ships in which that sort of fever was which proceeded from a similar cause, that is, filth and animal effluvia. Upon the whole, in those ships in which the fever was most malignant, there the fewest fluxes were found.

Several circumstances contributed to the increase of sickness and mortality this month.

1st. The infection, or rather the foul air, of the French prizes, in most of which a very bad fever broke out among the officers and men that were sent from the ships of our fleet to take charge of them.



The discipline and internal œconomy of the French ships of war are greatly inferior to those of the British. Their decks are never washed, and there is a great defect in every point of cleanliness and order. The free course of the air is obstructed by lumber of every kind, and by bulkheads, which are not taken down even in the time of battle; and the gratings are covered night and day with tarpaulins, even in a hot climate. There are not even scuppers opened on the lower deck as outlets to the water and filth, which necessarily accumulate there, and for which the only vent is a pipe contrived on purpose, passing from that deck along the ship's side into the hold, which becomes thereby a common sink, inconceivably putrid and offensive. And in addition to the ordinary causes of corruption, there was one peculiar to the occasion; for the blood, the mangled limbs, and even whole bodies of men, were cast into the orlop, or hold, and lay there putrifying for some time. The common sailors among the French have a superstitious aversion to the throwing of bodies overboard immediately after they are killed, the friends of the deceased wishing to reserve their remains, in order to perform  
a religious

a religious ceremony over them when the hurry and danger of the day shall be over. When, therefore, the ballast, or other contents of the holds of these ships, came to be stirred, and the putrid effluvia thereby let loose, there was then a visible increase of sickness. For the first three weeks after the capture of these ships, the stench proceeding from the numbers of wounded men contributed also to taint the air.

The *Ville de Paris* was much more sickly than the other prizes, not only from her being larger, and thereby containing a greater mass of foul air, but by receiving the surviving part of the crew of the *Santa Monica*, one of our frigates, which had been cast away on the Virgin Islands, and whose men were so reduced by hardship and intemperance, that most of them were taken ill as soon as they came to breathe the unwholesome air of the French prize. To whatever cause it was owing, the fever was much more violent here than in the other prizes, and it generally carried men off on the third or fourth day; and what is remarkable, the officers were affected by it in a greater proportion than the common men. One lieutenant,

tenant, and every warrant officer, except the boatswain, died of it. This was a proof that the sickness was owing to the bad air, and not to the intemperance and irregularity so usual on board of prizes, which only the common men give into; and the probable cause of the officers being most affected is, that they were accustomed in common to a purer air, by living in the most clean and airy parts of the ship.

It is also remarkable, that the Ville de Paris was healthy when taken, and had been so ever since leaving France in March 1781; nor had any other of the captured ships of the line been sickly for some time before, except the Ardent, when she arrived at Martinico, four months before, at which time the greater part of the crew were sent to the hospital with fevers. This, as well as other facts of the same kind, tends to prove, that when men come to be much habituated to bad air, their health is not affected by it.

The French ships were purified by washing and scraping, by fumigating daily with gunpowder and vinegar, and by the use of wind sails; but nothing seemed to contribute so



much to sweeten the air in them as burning fires in the hold ; for this tended both to make the putrid matter exhale, and to carry it off, by producing a perpetual change of air. Captain Curgenvén, who at this time commanded the *Ville de Paris*, had great merit from his very assiduous and successful endeavours in so difficult a duty as the management and equipment of this great ship. In consequence of the judicious measures taken, and the men becoming more used to the bad air, the sickness ceased in the course of a few weeks.

In the accounts given in the tables, the French prizes are not included, for the disorderly state in which they were at this time prevented my receiving regular returns ; but having made inquiry concerning the mortality in the *Ville de Paris*, I found, that of a crew of three hundred and twelve men, there died ten in the month of May, and that thirty had been sent to the hospital, whose cases were so unfavourable, that about one half died. The only diseases were fevers. The surgeon of the *Ardent* told me about the same time, that one third of the crew of that ship was ill of fevers.

The



The second cause of the prevalence of sickness, while the fleet was at Jamaica, was, the watering duty, which was carried on at Rock-fort, about three leagues from Port Royal. It was the practice of many of the ships to leave the water casks on shore all night, with men to watch them; and as there is a land wind in the night, which blows over some ponds and marshes, there were hardly any of the men employed on that duty who were not seized with a fever of a very bad sort, of which a great many died. The ships that followed a different practice were somewhat longer in watering; but this was much more than compensated by their preserving the health and saving the lives of their men.

The land wind which blows on the shore in the night time, is a circumstance in which Jamaica differs from the small islands to windward, over which the trade wind blows without any interruption: but though this land wind blows upon Port Royal from some marshes at a few miles distance, it does not seem to produce sickness, for it is a very healthy place, and several of the ships enjoyed as good health as in the best situations

on the windward station. The bay which forms this harbour is bounded towards the sea by a peninsula of a singular form, being more than ten miles in length, and not a quarter of a mile broad at any part. Great part of it is swampy and overgrown with mangroves, and though of such small extent, we fancied that some of the ships that lay immediately to leeward of this part were more sickly than those that were close to the town of Port Royal, which stands at the very extremity of this long peninsula, upon a dry, gravelly soil.

The weather this month was uniformly dry in port; but at sea the air was moist and hazy. Between Jamaica and Hispaniola, where part of the squadron was left to cruise, dead calms prevailed; and this, joined to the moisture of the air, was probably what caused the flux to prevail chiefly in this part of the fleet. At Port Royal, on the contrary, there was a strong dry breeze, which set in every day about nine o'clock in the morning, and blew all day so fresh, that there was frequently danger in passing from one ship to another in boats. This is called, in the language of the country, the *fiery sea-breeze*, an epithet which it seems to have got not so much from its absolute heat, as from

from the sensation of heat which it causes by drying up the perspiration. It was remarked, that this breeze was stronger this season than had ever been remembered; and it sometimes even blew all night, preventing the land breeze from taking its usual course. This year was farther remarkable for the want of the rains that were wont to fall in the months of May and June. We shall have occasion to remark hereafter, that this was a very uncommon season also in Europe and America. The heat, by the thermometer, this month, on board of a ship at Port Royal, was, in general, when lowest in the night, at  $77^{\circ}$ , and when highest in the day, in the shade, at  $83^{\circ}$ .

There was a considerable increase of scurvy in this month, compared with the former months of this campaign; but very inconsiderable, compared with what had occurred in cruises of the same length in former years. The last division of the fleet had been at sea seven weeks, all but one day, when it arrived at Port Royal; and though the scurvy had appeared in several of the ships, it did not prevail in any of them to a great degree, except in the *Nonfuch*. Out of fourteen deaths

deaths which happened in the whole fleet from this disease, in May, seven of them were in this ship, and several were sent from her to the hospital in the last and most desperate stage of it. But, upon the whole, the cases of the true sea scurvy in the fleet, in general, were few and slight, and a great many of those given in the reports under the head of scurvy, were cutaneous eruptions or ulcers, not properly to be classed with it.

The cruise in the preceding year to windward of Martinico, may be compared with that in May of this year; for the fleet in both cases had been at sea about the same length of time. But the comparison is very greatly in favour of the latter, which is most probably to be imputed to the plentiful supply of melasses, wine, four krout, and essence of malt. But no adequate reason that I could discover can be assigned for the prevalence of it in the *Nonfuch* to a degree so much more violent than in the other ships; and it was here farther remarkable, that it attacked every description of men indiscriminately; for I was assured by the officers and by the surgeon, that not only the helpless and dispirited landsman was affected, but  
old



old seamen, who had never before suffered from it on the longest cruises. I have been led by this, and some other facts, to suspect that there may, in certain circumstances, be something contagious in this disease.

## J U N E.

The greater part of the fleet remained at Jamaica during this month, refitting and watering. Twelve ships of the line were sent to sea on the 17th, under the command of Rear-admiral Drake, but not being able to get to windward on account of the fresh breezes that prevailed, they returned to Port Royal on the 28th. Such of these ships as were sickly, became more healthy while at sea; but some bad fevers arose, particularly in the *Princessa*; and it is a curious circumstance, that these fevers attacked only those men who had been on shore on the watering duty; from which it would appear, that something caught or imbibed from the exhalations of the soil, which is the cause of the fever, lies dormant for some time in the habit, like the specific morbid poisons, some of the men not having been affected for more than a week after they had been at sea.

The

The weather continued dry and windy, as in the former month; but the heat was in general about two degrees higher, the thermometer varying from  $79^{\circ}$  to  $84\frac{1}{2}^{\circ}$ .

TABLE, shewing the proportional Sickness and Mortality in June.

DISEASES.	Proportion of those taken ill in the Course of this Month.	Proportion of those who died, in relation to the Numbers of the Sick.
Fevers - - -	ONE IN $\left\{ \begin{array}{l} 11 \\ 20 \\ 47 \\ 37 \end{array} \right.$	ONE IN $\left\{ \begin{array}{l} 19 \\ 83 \\ 231 \\ 97 \end{array} \right.$
Fluxes - - -		
Scurvy - - -		
Other Complaints		
General Proportion	6	39

The proportion of deaths in relation to the whole numbers on board, was one in one hundred and thirty-eight.

There was only one in thirty of the sick sent to the hospital in the course of this month.

H

There

There was an increase both in the numbers and fatality of fevers. This increase was chiefly in that sort of fever which depends on the air and climate, the greater part of which was caught on the watering duty. There was a diminution of those fevers depending on infection, and the foul air of ships, which arose in the French prizes. The care that was taken in purifying these ships was very effectual; for only four died this month in the *Ville de Paris*, and fewer also were sent to the hospital than in May. The increase of the other kind of fever was chiefly owing to there being a greater number of ships in port, the crews of which were employed in watering, and partly, no doubt, to the increase of heat in the weather. The ships in which the fevers were most fatal were the *Monarch*, the *Duke*, the *Torbay*, and the *Resolution*. The sickness in the *Duke* was still in a great measure owing to the same infection that had hitherto prevailed; for this ship had never been cleared of the infectious fever, for want of room at the hospital. That which broke out in the *Torbay* was also of the low infectious kind, few of them having the symptoms of that which is peculiar

liar

liar to the climate, which prevailed in the other ships. This ship, though formerly very subject to infectious complaints, had been remarkably healthy for some time past; but it would appear that there was a large stock of latent infection, which shewed itself from time to time. The presence of infection does not necessarily excite disease, a concurrence of other circumstances being requisite, as shall be more fully shewn hereafter.

Some ships, particularly the Montague and Royal Oak, had no increase of fevers or other complaints, though the one lay in port for seven, and the other for eleven weeks, and were more or less exposed to the causes of sickness which affected the rest of the fleet. This is another proof, that a particular combination of causes is necessary to produce a disease, no single one, however powerful, being sufficient, without the concurrence of others. What seemed to be wanting here was the pre-disposition requisite for the admission of disease into the constitution; for the ships that enjoyed this happy exemption were such as had long-established and well-regulated crews, accustomed to the service and climate.



There had been this month a diminution both of the numbers and mortality of fluxes, which is agreeable to what was before remarked, that fevers were more apt than fluxes to prevail in the bad air of a harbour \*. It was also before remarked, that there were few or no fluxes in those ships in which the fever was most malignant; and now that the fever began to grow more mild in the French prizes, the flux began to appear. In the *Barfleur*, *Duke*, and *Namur*, both diseases seemed to prevail equally; but the fevers, though numerous, were more of the low nervous kind than bilious or malignant; and the fluxes chiefly attacked those who were recovering from fevers. We may farther remark, that these three men of war

\* I have seen an account of the diseases of the army at St. Lucia for a whole year, kept by Mr. Everard Home, an ingenious gentleman belonging to the army hospital, and it appears, that, during ten months out of the twelve, the dysentery was the predominant disease. This seems to contradict the opinion, that the land air is more apt to occasion fevers than fluxes; but it is to be remarked, that the sickness of the soldiers on this island was not so much owing to the malignant influence of the air, the situation of the garrison being high and airy, as to the bad accommodations and provisions, together with hard labour.

were

were three-decked ships, of 90 guns, the crews of which being more numerous, and composed of a more mixed set of men, were consequently subject to a greater chance of infection, and a greater variety of complaints. The Formidable still remained healthy to an extraordinary degree. Some fevers were indeed imported from the Ville de Paris by men that had been lent to that ship, and who were taken ill after their return. Of these, a few of the worst cases were sent to the hospital, and two died on board, who, with one that died the preceding month, make the whole loss of this ship by death, since leaving England, amount only to three men.

There has been little or no increase of scurvy this month; for though the numbers put on the list appear to be greater, the mortality is much less. It may indeed appear a matter of surprise that there should have been any scurvy at all, considering that the greater part of the fleet was at anchor all this month. But as this was the greatest fleet that had ever visited Jamaica, it was impossible to find fresh provisions for the whole; so that the supply they had

did not amount to one fresh meal in a week. Port Royal is also remote from the cultivated part of the island, so that fruit and vegetables were both scarce and high priced, particularly this year, on account of the usual rains in May and June having failed. There was, however, an allowance of fresh provisions and vegetables made to the sick by public bounty; for as the hospital could contain but a small proportion of the sick and wounded, an order was given for the supply of fresh meat, fruit, and vegetables, to the sick, and five hundred pounds of Peruvian bark were also distributed as a public gratuity, besides sugar, coffee, and wine.

With these aids, and the various good articles of victualling from England, the fleet was preserved uncommonly healthy for a West-India campaign: for though the mortality had increased considerably during our stay at Jamaica, yet the loss of men, upon the whole, was small, compared with that of other great fleets in this climate on former occasions. The greatest squadron, next to this, that had ever been on this station, was that under Admiral Vernon in the year 1741, at the same season. From this fleet  
upwards

upwards of eleven thousand men were sent to the hospital in the course of that and the preceding year, of whom there died one in seven, besides what died on board of their own ships and in two hospital ships \*. The disproportion of sickness in the two fleets will appear still greater, when it is considered that Admiral Vernon's contained only fifteen thousand seamen and marines †; whereas that under Lord Rodney contained twenty-two thousand. What added to the sickness of the former was the unfortunate expedition to Carthagena in April, 1741; to which probably it was owing that a much greater proportion of yellow fevers were landed from the fleet at that time than from ours, as appears by the papers left by Mr. Hume, who was then surgeon of the hospital. The hospital was then at a place called Greenwich, on the side of the bay opposite to Port Royal, and was very large; but it was found to be in a situation so extremely unhealthy, that it was soon after abandoned

\* See Essay on the Yellow Fever, by Dr. Hume, in a Collection of Essays published by Dr. D. Monro.

† Campbell's Lives of the Admirals, Vol. IV.



and demolished, and the hospital has since been at Port Royal.

It appears by the tables, that a greater number was put on the list under the head of *other complaints* in this month than the last. This was owing to the great number of ulcers which I have remarked to keep pace with feverish as well as scorbutic complaints; for when the constitution of the air is favourable to disease, or the habit of body prone to it, wounds and sores are found then to be more difficult of cure. There were twelve deaths besides those occasioned by what have been called the three epidemics. Of these, five perished by drowning and other accidents, three died of ulcers, one of wounds received in action, one of *cholera morbus*, and one of an abscess.

It has appeared that very few ships of this numerous fleet preserved their health while lying at anchor; and it would seem that short and frequent cruises are very conducive to health. It was eleven weeks from the time that the first of our fleet came to anchor at Jamaica till the main body of it sailed for America on the 17th of July.

Great

Great fleets are in time of war under the necessity of being at one time longer at sea, and at another time longer in port, than is consistent with the health of the men, the ships being obliged to act in concert and to co-operate with each other. This is one reason, among others; for ships of the line being more sickly than frigates. As ships of war must be guided by the unavoidable exigencies of service, it would be absurd to consider health only; but if this were to be the sole object of attention, a certain salutary medium could be pointed out in dividing the time between cruising and being in harbour; and it is proper that this should be known, that regard may be had to it, as far as may be consistent with the service. I would say, then, that men ought not to be more than six or seven weeks at one time upon sea victualling, and that a fourth part of their time spent in port would be sufficient to replenish their bodies with wholesome juices. If there is a supply of beer, or if the cruise or voyage is made in a warm climate, it may in most cases be extended a week or two longer without much risque of scurvy. This computation proceeds on the supposition, that ships are not supplied with  
the

the antiscorbutic fruits, nor their juices. If they are furnished with these, they may keep the sea for four or five months, as has been proved by the voyages that have been made to India since the last edition of this work. These stores are particularly serviceable in the present improved state of navigation, for in consequence of the method of ascertaining the longitude by lunar observations, voyages can be protracted to a much greater length than formerly, and the time that used to be necessary for staying in port with a view to repairs, is so much abridged by the late general practice of sheathing with copper, that war and commerce could not avail themselves to the utmost of these admirable inventions unless means were fallen upon for preserving the men from the sea scurvy. The use of lemon or lime juice perfectly answers this end.

Though contagion is not so apt either to arise or to spread in this climate as in colder ones, there were several circumstances about this time tending to prove that it may exist in a hot climate. Those ships which had their men returned to them from the French prizes, in all of which fevers prevailed,

vailed, had an increase of sickness not only in the men that were returned, but in the rest of the crew. There was another presumption of contagion, from the proportion of mortality among the surgeons and their mates, who were by their duty more exposed to the breath, effluvia, and contact of the sick. There died, during our stay at Jamaica, three of the former, and four of the latter, which is a greater proportion than what died of any other class of officers or men.

It has been the opinion of some, that continued fevers do not arise from any putrid *effluvia*, except those of the living human body, or some specific infection generated by it while under the influence of disease. It has been alleged in proof of this, that the putrid air in some great cities is breathed without any bad effects; and a celebrated professor of anatomy \* used to observe, that those employed in dissecting dead bodies did not catch acute diseases more readily than other people. I believe this may be true, in a climate like Europe, where cold invigorates the body, and enables it to resist the effects

\* The late Dr. William Hunter.



of foul air; but I am persuaded it is otherwise in tropical climates. The external heat of the air induces great languor and relaxation, and we cannot breathe the same portion of air for the same length of time in a hot as in a cold climate, without great uneasiness. The want of coolness must, therefore, be compensated by a more frequent change of air, and by its greater purity: any foulness of the air is accordingly more felt in a hot climate. There is something in purity of air which invigorates the circulation, and refreshes the body; and the contrary state of it depresses and debilitates, and to a much greater degree in a hot climate. There is not quite a fourth part of the common air of the atmosphere fit for the support of life; and any other admixture, diminishing this proportion, will tend to induce disease, like any other debilitating cause, independent of infection or any specific quality, especially where a greater degree of purity is called for in consequence of the greater degree of heat. There was no reason to suspect any infection in the *Ville de Paris*; for there was no sickness on board of this ship when in possession of the enemy, and the sickness that prevailed after her being captured seemed

seemed to proceed from what may be called simple putrefaction. There was an instance of the same kind in one of our own ships of the line, in which a bad fever broke out in the beginning of July, which seemed to be owing to the foul air of a neglected hold; for there was a putrid stench proceeding from the pumps, which pervaded the whole ship. I perceived this very sensibly one day, when visiting some officers who were ill of fevers; and before I left the ship an alarm was given of two men being suffocated in what is called the *well*, which is the lowest accessible part of the hold. This fever was of a very malignant kind, and fell upon the officers more than the men; for six of them were seized with it, of whom three died on the third day after being taken ill.

The fevers, which were of the greatest malignity at this time, affected the officers more than the common men. Only one captain died at Jamaica while the fleet was there, and it was of this fever. We lost five lieutenants, of whom four died of it; and this was the disease which carried off the three surgeons. But foul air was not the only cause that produced this fever  
among

among the officers, several of whom brought it on by hard drinking, or fatiguing themselves by riding or walking in the heat of the sun. It cannot be too much inculcated on those who visit tropical countries, that exercise in the sun, and intemperance, are most pernicious and fatal practices, and that it is in general by the one or the other that the better sort of people, particularly those newly arrived from Europe, shorten their lives.

Before leaving Jamaica, I sent to England a Supplement to the Memorial given in last year \*.

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## C H A P. V.

THE season of the hurricanes approaching, and all the convoys destined for England this year being dispatched, the main body of the fleet, consisting of twenty-four ships of the line, left Port Royal on the 17th of July, under the command of Ad-

\* See Appendix to Part II.

miral Pigot, in order to proceed to the coast of America. A great convoy for England had been sent off a few days before, protected by the *Ville de Paris* and six other ships of the line, which we overtook and passed at the western extremity of Jamaica. When we arrived off the Havannah, a large squadron of the enemy was seen there in readiness to sail, which induced the Admiral to wait in sight of it for the convoy, which did not come up till ten days after. Owing to this delay, and our meeting with baffling winds on the rest of the passage, we did not arrive at New York till the 7th of September. We found there the *Invincible* and *Warrior*, which sailed after us, but arrived before us, by having taken the windward passage.



TABLE, shewing the proportional Prevalence of different Diseases, and their Mortality, in July, 1782.

DISEASES.	Proportion of those taken ill in the Course of the Month.	Proportion of Deaths, in relation to the Numbers of the Sick.
Fevers - - -	ONE IN { 13½ 24 91 20	ONE IN { 16 49 0 134
Fluxes - - -		
Scurvy - - -		
Other Complaints		
General Proportion	5½	33

The mortality this month, in relation to the whole numbers on board, was one in a hundred and thirty.

There were only one in thirty-eight of the sick sent to the hospitals.

The fevers arose chiefly during the first two weeks after leaving Jamaica, which renders it probable that the seeds of them

were brought from thence. Had they been owing to the heat simply, they would have been as apt to arise in some subsequent part of the passage; for the tropical heats at this season of the year extend to the 30th degree of latitude, which we did not cross till the 22d of August, that is, near five weeks after leaving Jamaica. The only ships in which the fever could be imputed to infection or foul air were the *Barfleur*, *Alcide*, and the *Aimable* frigate. The first had received, as recruits, at Jamaica, men who had been confined for some time before in a French jail, and a fever of a bad kind spread on board of her soon after. The *Aimable* was a prize from the French; and the sickness was here so evidently owing to foul air, that, whenever the contents of the hold were stirred, so as to let loose the putrid effluvia, there was then an evident increase of sickness. The fever in the *Alcide* was of a peculiar slow kind, to be described hereafter, and seemed to be a continuation of the same infection which had so long existed in that ship.

The *Duke*, which had hitherto been by far the most subject to fevers of any ship

in the fleet, became more and more free from them even in the most early part of this passage, and might be said to be entirely so at the time she arrived in America. The fever had been so very prevalent in this ship since leaving England, that there was hardly a man who had escaped it. Could this have any effect in making them less liable to catch it a second time?

In the course of this passage the dysenteries came to prevail over the fevers, as we have found to be commonly the case at sea. It appears by comparing this table with the preceding, that the mortality in fevers was much the same in both, and that in the dysentery it was greater than while the fleet was at Jamaica. This does not argue, however, that the diseases were equally malignant, but was owing to the want of an hospital, and of those comforts of diet which the sick enjoyed on board while in harbour. This last was particularly felt in the dysenteries, in the cure of which more depends upon diet than in most other diseases. In all the calculations of mortality on board of ships, if any have been sent to the hospital, they are to be deducted from the number; and

and these make a greater difference in the mortality on board than their numbers simply would indicate ; for only the worst cases, and those therefore who were most likely to die, used to be sent to the hospital. But as the fleet was at sea during the whole of this month, no allowance of this kind is to be made.

TABLE, shewing the proportional Sickness and Mortality in August.

DISEASES.	Proportion of those taken ill in the Course of the Month.	Proportion of Deaths, in relation to the Numbers of the Sick.
Fevers - - - - -	ONE IN { 31 46 25 27	ONE IN { 17 35 66 43
Fluxes - - - - -		
Scurvy - - - - -		
Other Complaints - -		
General Proportion, -	{ 7½	{ 31

The mortality this month, in relation to the whole numbers on board, was one in one hundred and sixty-nine.



The scurvy began to appear very soon upon this passage ; for by the end of August, at which time the fleet had only been six weeks at sea, and that in a warm climate, and in dry weather, it had made considerable progress. It first appeared and prevailed most in the Prince George and Royal Oak, though they had been ten weeks at Jamaica. This was the first sickness with which the latter had been affected since arriving in the West Indies ; and there was no perceivable peculiarity in either of them to account for their being subject to it more early, or more violently, than the rest of the fleet. If the disease is contagious, as has been suspected, there might be a few men on board of them, who, being uncommonly prone to the disease, would be soon affected, and communicate it, or at least hasten the symptoms in those who might be less predisposed to it. But this is only conjecture. Before the end of the voyage, the whole fleet was more or less afflicted with it, though it had been only seven weeks and three days at sea ; but the men had received so few refreshments while in port, that their constitutions were prepared to fall into this disease. The *Barfleur*, *Alfred*, and *Princessa*,  
were

were most affected with it next to the two ships mentioned above.

The seventeen ships which arrived from England in February and March were much less affected with it than the rest of the fleet, which was, no doubt, owing to the wine, melasses, and four krout, with which they were so amply supplied. Though these articles were all expended before leaving Jamaica, yet the good effects of them on the constitutions of the men were visible in the course of this passage.

The America was the most free from it of all the ships of the old squadron; and this was owing to the extraordinary humanity and attention of the captain \*, who, as soon as any of the men were taken ill, allowed them wine and other refreshments from his private store. There was another proof in the Conqueror of the great importance of attending to this disease in its earliest stage. Mr. Lucas, the surgeon of this ship, by watching the first beginnings of it, by a proper regulation of diet, and the adminis-

\* Captain Samuel Thompson.

tration of the essence of malt and juice of limes, not only prevented the progress of the disease, but proved, that, with great attention, it may even be cured at sea. It is of the utmost consequence in this disease to put men on the sick list on the very first appearance of the symptoms, so that they may early have the advantage of proper treatment and regimen. It is only at this period of it that the effects of essence of malt are sensible; but we have seen that the juice of certain fruits will cure it in more advanced stages.

There is a very important remark suggested by comparing the two preceding tables with that which follows. It appears that in the month of September a much greater number was taken ill of scurvy, and also that there died of this disease a greater proportion than in the two preceding months. All the mischief from it in that month happened in the first week of it, during which as many died as in the whole month of August; for the fleet came to an anchor on the 7th of September at New-York, where the worst cases were immediately sent to the hospital, and those that remained on board were supplied with every necessary refreshment.

Had the fleet remained longer at sea, the mortality would probably have increased in the same progression; and this circumstance ought to be well considered in undertaking cruises.

TABLE, shewing the proportional Prevalence of Sicknefs and Mortality in September.

DISEASES.	Proportion of those taken ill in the Course of the Month.	Proportion of Deaths, in relation to the Numbers of the Sick.
Fevers - - - - -	49	31
Fluxes - - - - -	46	68
Scurvy - - - - -	15 $\frac{1}{2}$	39
Ulcers - - - - -	68	0
Other Complaints -	62	226
General Proportion -	7	58

The proportion of deaths, in relation to the whole numbers on board, was one in three hundred and ninety-eight.



About one third of all the sick were sent to the hospital.

As the proportion of ulcers was uncommonly great, I thought it worth while to make a calculation of it. The *Barfleur* had the greatest number; and this ship, for causes I cannot assign, was more afflicted with bad ulcers than any other in the fleet, for several months together.

The fleet having arrived at New York in this unhealthy state, the first care was to make provision for the sick. There were somewhat more than fifteen hundred on the sick lists of all the ships, and the hospital could accommodate little more than six hundred. In order that it might not be overcrowded, and that each ship might have a just share of relief, I went round the fleet to ascertain the due proportion of those cases that were the most proper objects for being sent on shore. All the infectious and acute complaints, and some of the worst scorbutics, were accordingly sent to the hospital. Those who were kept on board being chiefly such as were affected with the scurvy, were supplied with various refreshments in their  
respective

respective ships, and seemed to recover as soon as if they had been sent on shore. They had indeed almost every advantage enjoyed by those at the hospital; for, besides fresh meat thrice a week, and spruce beer daily in common with the other seamen, each man on the sick list was supplied every week at the public expence with four pounds of apples and half a pound of soap. There were also thirty casks of limes taken in a prize, which were distributed among the scorbutic men, and proved of infinite use. Admiral Pigot's great zeal for the good of the service, as well as his natural humanity, induced him to listen to whatever was proposed for the benefit of the men.

The supply of soap was a thing entirely new in the service; but the good effect of all the other articles would most probably have been defeated, unless the men had been furnished with the means of cleanliness, which is the most essential requisite of health. The advantage of this method will appear by the returns of next month to have been very conspicuous; and it was on this occasion more than any other that I saw realised in  
every

every particular the plan proposed in the memorial to the Admiralty. It may be added, that the sick that were left on board were not even without the recreation of the shore enjoyed by those at the hospital; for most of the captains had the attention to send daily on shore, for amusement and exercise, such as were able to walk. Thus there were all the advantages of an hospital obtained at much less expence to Government, and without the risque of intemperance, desertion, or infection, which are the inconveniencies connected with an hospital. What farther contributed to health at this time was, a large quantity of excellent wine with which the fleet was supplied.

TABLE, shewing the proportional Sickness and Mortality in October.

DISEASES.	Proportion of those taken ill in the Course of the Month.	Proportion of those died, in relation to the Numbers of the Sick.
Fevers - - - - -	45	250
Fluxes - - - - -	61	69
Scurvy - - - - -	34	197
Ulcers - - - - -	181	0
Other Complaints -	127	0
General Proportion -	12	196

The proportion of deaths in this month, in relation to the whole number on board, was only one in fourteen hundred and seventy-eight.

About one in twenty-nine of the sick was sent to the hospital.

There was, upon the whole, less sickness and mortality in this month than in any other



other during which I kept records of the fleet. This was, no doubt, owing in part to the climate, but was chiefly the effect of the extraordinary attention paid to the supply of refreshments for the men. The fleet was here exactly in the same situation, and at the same season, two years before, but was not near so healthy.

Nor were the advantages derived from the great plenty of refreshments, procured at this time at New York, merely temporary; for the men's constitutions were so much improved by them, that the part of the fleet which remained under the command of Lord Hood was at sea for twelve weeks without being affected by the scurvy. This was chiefly to be ascribed to the previous refreshments; for we have seen, that, in a passage of seven weeks from Jamaica to New York, the fleet was greatly affected with the scurvy, in consequence of not having had the advantages of fresh meat and vegetables when last in port. The climate had, no doubt, also a share in keeping off the scurvy; for the greater part of the twelve weeks was taken up in a cruise off St. Domingo; and, I believe, it never was known that a fleet  
was

was so long at sea, in a cold climate, without being greatly affected with this disease.

It appears, that though the proportion of fevers had increased somewhat this month over that of fluxes, yet the former were less fatal; and, I think, the true dysentery is more frequent in this climate, and more apt to prove fatal in its acute state, than in the West Indies. I have indeed preferred the term flux to that of dysentery, for this reason, that the symptoms in many cases did not rise so high as properly to constitute dysentery; and the disease proves fatal in the West Indies more frequently in the chronic than in the acute state. The fluxes were daily gaining ground when we left New York, and continued to prevail to a great degree in the *Magnificent*, which remained in that climate several weeks after us.

The climate and situation of the fleet had a greater effect in diminishing ulcers than any other complaints; for the proportion of them in this month is little more than one third of what it was in the last.

The

The calculation for October was made upon thirteen ships of the line, which sailed from New York on the 25th of that month.

The weather had then begun to grow cold; but few or none of the diseases peculiar to a cold climate had appeared. There occurred, while we were at New York, several cases of inflammation of the liver among the officers and men who came from the West Indies. It was remarked formerly, that this complaint hardly ever occurred in the West Indies; but it would appear that the residing there disposes to an inflammation of this organ upon changing to a colder climate.

The preceding summer had been uncommonly cold, not only in North America, but in the whole temperate part of the northern hemisphere, so far as I could learn by inquiry. In consequence of this, the crops failed in Europe, America, and the northern parts of Asia. The same circumstance had a remarkable effect on the reigning diseases of the season at New York; for instead of the bilious complaints common in the end of summer and in autumn,

a slight

a flight fever of the inflammatory kind had prevailed. An epidemic catarrh had spread all over Europe, and some part of Asia, in the earlier part of the year; and perhaps this was connected with the peculiar state of the atmosphere about this time. It was before observed, that there was something unusual in the state of the weather at Jamaica while the fleet lay there; and it is possible that this might be owing to the same general cause.

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## CHAP. VI.

**T**HIRTEEN ships of the line sailed from America for the West Indies on the 25th of October, under the command of Admiral Pigot, and the other half of the fleet was left under Lord Hood, to watch the motions of the French squadron, which was then at Boston.

The day on which we left the coast of America a storm came on, which lasted two days; but the rest of the passage being



ing fair and moderate, we arrived at Barbadoes on the 20th of November, where the fleet continued for the remainder of this month.

All the above-mentioned squadron, except two ships, is comprehended in the calculation of the following table, and also the Magnificent, Prudent, and Nonfuch. The two last had continued in the West Indies during our absence.

TABLE, shewing the Prevalence of Sicknefs and Mortality in November.

DISEASES.	Proportion of those taken ill in the Course of the Month.	Proportion of Deaths, in relation to the Number of Sick.
Fevers - - - - -	54	25
Fluxes - - - - -	78	132
Scurvy - - - - -	86	0
Ulcers - - - - -	94	0
Other Complaints -	46	103
General Proportion -	15	77

About

About a sixth part of the whole sick were sent to the hospital this month, and one half of these were sent to the hospital at Halifax from the Magnificent.

The proportion of deaths this month, in relation to the whole number on board, was one in eight hundred and eighty-seven.

Fewer were taken ill this month than the preceding, but more in proportion died; which might partly be owing to the fleet having been more at sea, and partly to the change of climate.

Fevers were now more numerous, and also more fatal than any other disease; and we see them follow the contrary proportion to fluxes in the progress to the southward, that they did in our progress to the northward. These fevers prevailed chiefly in the Formidable and Warrior. In the former it first appeared among some men that had been pressed at New York from a privateer, some of whom were seized a few days after our arrival at Barbadoes with the yellow fever, and they were the only instances of it at this time in the fleet.

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The

The scurvy continued to diminish, but the ulcers increased as we came into the torrid zone.

Diseases in general were so slight and so few at this time, that the whole squadron from America sent only forty-eight men to the hospital at Barbadoes from its arrival to the end of the month.

It may be proper here to give an account of some of the ships that remained on this station, while the main body of the fleet was in America.

The Prudent, when she left us, was extremely healthy, and continued so till a flux broke out in July, which was communicated by some men from a cartel, who were ill of this disease. It spread among the ship's company, and prevailed for three months. The only deaths during the seven months that this ship was separated from the fleet were, two from flux, and one from scurvy, and only twenty-five were sent to hospitals. This is a proof how much more healthy the windward station is than that of Jamaica. The scurvy arose at one time, in a  
cruise

cruise of five weeks, though there was no appearance of it at another time in a cruise of six weeks. ' The cause of this seems to be the difference of the weather at the two periods ; for it was very wet in the former, and very dry in the latter. The time in which this ship was most exposed to sickness was while she was under repair at Antigua, a situation in which hardly any ship escapes a severe visitation of sickness ; yet this ship was not at all affected by it, which seemed to be owing to the uncommon pains taken by the captain to prevent the men from labouring in the sun during the hot part of the day.

The *Nonfuch* was five months separated from the fleet, during which time ten men died. Nine of these died of fevers, and one of the dysentery. She sailed from Jamaica for Barbadoes about the same time that the fleet sailed for North America, and was nine weeks on the passage. A fever was the prevailing disease, and the men probably inhaled the seeds of it at Jamaica, in common with most of the other ships' companies that were there. The scurvy, which had formerly prevailed so much, appeared



at this time ; but it was in a very moderate degree, considering the length of the passage. None died of it, and few were so ill as to require being sent to the hospital. Had this ship gone into a colder climate, like the others, it would probably have prevailed to a greater degree. The whole number sent to the hospitals for various complaints, during the five months, was only thirteen.

The Nymph frigate was the only other ship left in the West Indies which is included in the tables. There happened only two deaths in her from June to October, both months included. One of these was from scurvy, the other from asthma. She was in that time upon two cruises, each of which lasted eight weeks. During the first the weather was dry and fine, and during the other it was wet and sultry, with the same effect upon health as in the Prudent ; for in the second cruise the scurvy prevailed to a considerable degree, but not at all during the first. This disease was prevented from becoming violent or fatal, on either occasion, by the great attention of Mr. Anderson, the surgeon. He found great benefit from the essence of malt, when given

§

early

early in the complaint; and some limes having been taken in a prize, while this disease was at the worst, the scorbutic men were so much recovered by the use of them, that they were all able to return to duty before the ship arrived in port.

## DECEMBER.

The whole squadron remained at anchor at Barbadoes, and nothing worth notice occurred till the arrival of a reinforcement of eight ships of the line, under Sir Richard Hughes, on the 8th of December. This squadron had been detached by Lord Howe, after the relief of Gibraltar, and the action with the combined fleets of France and Spain on the 20th of October. It consisted of one ship of 90 guns, one of 80, three of 74, and three of 64. They sailed from England on the 9th of September, and from that time till their arrival at Barbadoes they had not been in port, except for ten days that they were at Madeira, where they were supplied with fresh meat, fruit, and vegetables, by which means the scurvy, which had begun to prevail to a considerable de-

gree, was almost entirely eradicated, and the health of the men was surprisingly restored, considering the shortness of the time.

When they joined us, however, there was a good deal of sickness on board of them all, except the *Union* and *Ruby*. The former had been more than three years in commission, and in that time had never been sickly, and had now all the advantages of a long-established and well-regulated ship's company. All the rest had been newly commissioned and manned when they left England. The superior health of the *Ruby* was owing to her having been manned with the crews of other ships, some of which had just arrived from the West Indies; whereas the others had been manned chiefly by draughts of pressed men from guardships, or by raw volunteers, of whom a great many were raised in Ireland about this time. The *Bellona* and *Berwick* having been somewhat longer in commission than the rest, were less sickly.

The following tables will shew the comparative state of health of the squadron formerly on the station with that which had newly arrived from England.

TABLE,

TABLE, shewing the Prevalence of Sickness and Mortality in the old Squadron, in December.

DISEASES.	Proportion of those taken ill in the Course of the Month.	Proportion of Deaths, in relation to the Numbers of Sick.
Fevers - - -	ONE IN { 32 94 62 64 57	ONE IN { 80 99 0 0 71
Fluxes - - -		
Scurvy - - -		
Ulcers - - -		
Other Complaints		
General Proportion	ONE IN { 11 $\frac{1}{2}$	ONE IN { 124

The proportion of the deaths this month to the whole number of men belonging to this part of the fleet, was one in eleven hundred and two. There were fifty-six sent to the hospital, which was one in eighteen of all the sick.



TABLE, shewing the Prevalence of Sickness and Mortality in the new Squadron, in December.

DISEASES.	Proportion of those taken ill in the Course of the Month.	Proportion of Deaths, in relation to the Number of Sick.
Fevers - - -	11	55
Fluxes - - -	86	6
Scurvy - - -	107	0
Ulcers - - -	191	0
Other Complaints	56	54
General Proportion	5	64

The proportion of the deaths this month to the whole number of men belonging to this part of the fleet, was one in four hundred and forty.

There were one hundred and eighty-nine sent to the hospital; but the proportion to the whole number of sick cannot be ascertained, as we do not know how many were on the list on the first of the month.

The

The increase of fevers in the old squadron was chiefly owing to their having spread in the *Nonfuch* ; and they seemed to partake more of that kind which originates in jails and ships, than of that which is peculiar to the climate. The body of one of the men who died of this fever was inspected at the hospital, and there was found to be inflammation and even perforation of the intestines, without any previous symptom that could lead to expect such an appearance, a circumstance more likely to happen in the former sort of fever than the latter.

The increase of scurvy was owing to the numbers that were taken ill of it in the *Magnificent* on the passage from Halifax, from whence she sailed in the beginning of this month, and joined the fleet at Barbadoes in the end of it. There was a great deal of sickness in this ship at Halifax, and on the passage, owing to the want of such clothing as was suitable to that severe climate. One of the principal complaints was an inflammatory sore throat.

The great degree of health at this time enjoyed by the ship's company of the *Agamemnon* deserves particular attention, as it seemed to be owing to a circumstance in  
the

the mode of victualling, which might, without any expence, and with little trouble, be rendered general in the navy. This consisted in the use of soft bread, that ship having been supplied about this time with flour in place of biscuit. For thirteen weeks the whole ship's company had no bread but what was baked on board, and a certain proportion of it from that time till her arrival in England, in May 1783, at which time there was not a sick man on the list.

Baking may be managed with still greater facility now that the fire-place of ships of war is made of cast iron in place of brick-work as formerly. In the oven attached to the fire-place of a first rate, thirty-six quarter loaves can be baked at once, so that as often as the copper is used for boiling provisions baking can be performed without the least expence or inconvenience.

There was no change in the situation of the fleet, only that four ships of the line were sent on the 16th to cruise near Guadaloupe, and they continued at sea till the beginning of February.

The new squadron was much afflicted with the jail fever, brought from England; and

and it was much more prevalent, as well as malignant, on board of the Suffolk than any of the rest. During the passage it prevailed most in the Princess Amelia, not less than twenty having died of it. It subsided in this ship before she arrived in the West Indies; but on board of the Suffolk it continued to rage for some months after.

As the hospital at Barbadoes was too small to contain all the sick of this squadron, only the cases of greatest danger and the most infectious were sent on shore, and those that remained were provided with fresh vegetables and milk on board of their own ships, in the same manner as had been formerly practised with such success on similar occasions. This was continued for four weeks, during which time they all got into tolerable health, except the Suffolk.

There appeared, by the returns of the new squadron, to be a greater number under the head of "Other Complaints," which was owing to the number of pulmonic complaints, the consequence of the influenza which prevailed in Europe, at sea, as well as on shore, in the spring and beginning of the summer of this year.

Though



Though inflammatory complaints are rare in this climate, yet in a few of the ships there was some appearance of them; and I remarked that they occurred in those ships which were in other respects most healthy, and most free from infection. A good many of the men were seized with inflammatory fore throats in the *Bellona* a few days before she arrived at Barbadoes, and this was in other respects the most healthy ship next to the *Union* and *Ruby*. In the *Union* there was no violent acute complaint whatever, which was very singular among so great a body of men; but several rheumatisms, coughs, and catarrhs, arose in her this month, and there even occurred two pleurifies in the following month. The bowel complaints which occurred on board of this ship were also of an inflammatory nature. These distempers seemed to proceed from accidental exposure and irregularity; and is it not highly probable that these causes, instead of producing local inflammatory complaints, might have been the means of exciting bad fevers and fluxes, as in the other ships, had the men been equally predisposed to them, by living in foul air, or under the influence of infection?

The

The following tables will shew the comparative state of health of the two squadrons in the three first months of next year.

TABLE, shewing the Prevalence of Sicknefs and Mortality in the old Squadron in January, 1783.

DISEASES.	Proportion of those taken ill in the Course of this Month.	Proportion of Deaths, in relation to the Numbers of the Sick.
Fevers - - - - -	67	70
Fluxes - - - - -	157	0
Scurvy - - - - -	44	0
Ulcers - - - - -	0	0
Other Complaints -	48	117
General Proportion -	12½	214

The mortality this month, in relation to the whole numbers on board, was one in twelve hundred and fifty-seven. About one fifteenth of all the sick were sent to the hospital.

TABLE,

TABLE, shewing the Prevalence of Sickness and Mortality in the new Squadron in January, 1783.

DISEASES.	Proportion of those taken ill in the Course of the Month.	Proportion of Deaths, in relation to the Numbers of the Sick.
Fevers - - - - -	12	48
Fluxes - - - - -	29	153
Scurvy - - - - -	320	0
Ulcers - - - - -	137	0
Other Complaints -	19	0
General Proportion -	5 $\frac{1}{2}$	109

The proportion of deaths to the whole number on board was one in five hundred and forty. About one in thirty of all the sick were sent to the hospital.

TABLE,

TABLE, shewing the Prevalence of Sicknefs and Mortality in the old Squadron in February.

DISEASES.	Proportion of thofe taken ill in the Courfe of the Month.	Proportion of Deaths, in relation to the Numbers of the Sick.
Fevers - - - - -	46	69
Fluxes - - - - -	159	0
Scurvy - - - - -	63	0
Ulcers - - - - -	100	0
Other Complaints - -	51	136
General Proportion, -	13½	173

The proportion of deaths to the whole number on board was one in fixteen hundred and ninety-seven. One ninth of all the fick were sent to the hofpital,



TABLE, shewing the Prevalence of Sicknefs and Mortality in the new Squadron in February.

DISEASES.	Proportion of those taken ill in the Course of the Month.	Proportion of Deaths, in relation to the Numbers of the Sick.
Fevers - - - - -	30	50
Fluxes - - - - -	34	0
Scurvy - - - - -	212	0
Ulcers - - - - -	174	0
Other Complaints -	52	0
General Proportion -	11	185

The proportion of deaths to the whole number was one in twelve hundred and seventy-six. The proportion sent to the hospital was the same this month as in the other part of the squadron.

TABLE,

TABLE, shewing the Prevalence of Sickneſs and Mortality in the old Squadron, in March.

DISEASES.	Proportion of thoſe taken ill in the Courſe of the Month.	Proportion of Deaths, in relation to the Numbers of Sick.
Fevers - - - - -	28	12 $\frac{1}{2}$
Fluxes - - - - -	71	0
Scurvy - - - - -	46	0
Ulcers - - - - -	226	0
Other Complaints - -	76	44
General Proportion -	11	194

The proportion of deaths to the whole number was one in thirteen hundred and fixty-one. About one ninth of all the ſick were ſent to the hoſpital.

TABLE, shewing the Prevalence of Sicknesses and Mortality in the new Squadron, in March.

DISEASES.	Proportion of those taken ill in the Course of this Month.	Proportion of Deaths, in relation to the Numbers of Sick.
Fevers - - - - -	44	0
Fluxes - - - - -	49	0
Scurvy - - - - -	123	0
Ulcers - - - - -	183	0
Other Complaints -	38	138
General Proportion -	12	403

The proportion of deaths to the whole number was one in four thousand and eighty-seven. About one in eleven of all the sick were sent to the hospital.

The main body of the fleet remained at Barbadoes till the 12th of January, when  
§ they

they went to cruise to windward of Martinico, with a view to intercept a French squadron expected from North America. This cruise lasted four weeks; and intelligence being received of the enemy's having taken a different route, the whole fleet bore away for St. Lucia, where it came to an anchor on the 8th of February.

In the course of the three months above mentioned, we see the two squadrons approaching to each other, in point of health, till they became pretty equal and similar; and the new squadron became even somewhat more healthy than the old.

The increase of fevers in the old squadron was owing to two causes. One was the importation of new-raised recruits brought from England by some ships that arrived in the beginning of January. These were distributed to such ships as stood most in need of men; and being very dirty and ill cloathed, were likely to harbour infection. They were evidently the cause of sickness in the Warrior and Royal Oak; for these ships were before that time healthy, and the fever began with these strangers, and spread



amongst the former crew. It is remarkable that the ships that brought them from England were not affected by them.

It was caught in the Royal Oak from six men that came from England in the Anson, which men, though first put on board the Namur, communicated no fever there, having been kept separate from the rest of the men; but being sent to the Royal Oak, they were themselves first taken ill with a fever, which afterwards spread to about thirty of the other men. What was singular in this fever was, that the eyes and skin of all that were affected by it became yellow, though without any particular malignancy; for only two died on board, and one in the hospital. There was one whose skin was very yellow, yet his complaint was so slight as never to confine him to his bed.

The other cause of the increased proportion of fevers in the old squadron was, the great number of these complaints that arose in the Magnificent. This ship having been sent on a cruise about the middle of February, and the weather being rainy, squally, and uncommonly cold, for the climate,  
many

many fevers of the inflammatory kind appeared. During this cruise she made prize of a large French frigate, called the Concord, and the greater part of the prisoners being taken on board, the fever from that time assumed a different type, with new and uncommon symptoms; for, instead of being inflammatory and requiring bleeding, as before, it became more of a low, putrid kind, and was attended in most cases, if not in all, with a continual sweating; so that, instead of evacuations, the remedies that were found most effectual were the Peruvian bark, blisters, and opium. Thus we see fevers variously modified according to men's constitutions, the state of the air, and the noxious *effluvia* of the strangers that intermix with them.

We find the proportion of fluxes increasing in the new squadron in January and February, as they had formerly done in most of the ships soon after their arrival from England. They were observed also to prevail principally in those ships that had formerly been most subject to fevers, and not to arise till the fever had subsided. They were found, for instance, to arise later in

the Suffolk, where the fever was obstinate and malignant, than in the Princess Amelia, where the fever had been at one time general and fatal, but not so violent and lasting as in the other.

The four ships that were sent to cruise near Guadaloupe continued at sea for seven weeks; and it was owing to the prevalence of scurvy in these and in the Magnificent, that the proportion of that disease was greater at this time in the old than in the new squadron.

The fleet remained at St. Lucia till the accounts of the peace arrived in the beginning of April. The service was then at an end, and I returned to England with the first division of the fleet, which sailed from St. Lucia on the 12th of April, under the command of Rear-admiral Sir Francis Drake, who was at this time in extremely bad health, and requested me to accompany him.

## P A R T I.

## B O O K III.

Of the Numbers and Mortality of different  
Diseases sent to Hospitals.

## C H A P. I.

**I**N order to judge of the loss sustained by disease in the course of that service of which a relation has been attempted, the sick sent to the hospitals must be taken into account. I shall, therefore, exhibit a short view of the different diseases admitted, and their mortality, at the several hospitals connected with the fleets in which I served. This will serve also to illustrate the different effects that different situations have upon the health and recovery of men\*.

The fleet which effected the first relief of Gibraltar, under the command of Lord

\* As my own stay at different ports was short, and as my own knowledge could not extend beyond that period, Dr. Farquarson, First Commissioner of Sick and Wounded Seamen, very politely gave me leave to inspect the books of the different hospitals at his office, and I collected from them the fate of all the men that were landed.



Rodney, consisting of twenty ships of the line, arrived there in the third week of January, 1780, after a passage of three weeks and a few days from England, in which they had an action with the Spanish fleet, and obtained a victory over them, on the 16th of that month. The whole fleet, except one ship, sailed from Gibraltar on the 13th of February, and while it lay there, the diseases sent to the hospital, and their respective mortality, were as follows \* :

\* It is proper to mention, that the name of the disease in the hospital books being taken from the ticket sent on shore with each sick person, great accuracy is not to be expected, as this is frequently done in a careless manner. My returns were made with great exactness; and, in the latter part of the war, the hospital books may also be depended upon in this respect, the tickets, at my request, having been made out with accuracy.

D I S E A S E S.	Admitted.	Died.	Proportion.
Fevers - - - -	622	65	<div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: 2em; margin-right: 5px;">O N E I N</div> <div style="font-size: 4em; margin-right: 5px;">{</div> <div style="display: flex; flex-direction: column; align-items: center;"> <math>9\frac{1}{2}</math> <math>\bar{0}</math> 13 7 3 4 </div> </div>
Fluxes - - - -	17	0	
Scurvy - - - -	13	1	
Ulcers - - - -	20	3	
Wounds - - - -	29	9	
Other Complaints	12	3	
* Total - -	713	79	9

This comprehends not only the deaths in the time the fleet remained there, but all that happened afterwards. The mortality, from wounds and ulcers, is greater than might be expected in so fine a climate, and at the coolest season of the year; but as the place was then besieged, the sick and wounded could not be supplied with those refreshments that were necessary to the recovery of the men, and wounds and ulcers are complaints very apt to be affected by the quality of the diet.

\* In this, and the other tables, the smaller fractions are neglected.

The

The following is an Account of the Men admitted at the Hospital at Barbadoes in the Campaign of 1780, that is, from the 16th of March till the end of June :

DISEASES.	Admitted.	Died.	Proportion.
Fevers - - - -	277	43	ONE IN $6\frac{1}{2}$ 4 4 $5\frac{1}{2}$ $2\frac{1}{2}$ $5\frac{1}{2}$
Fluxes - - - -	70	22	
Scurvy - - - -	199	47	
Ulcers - - - -	92	16	
Wounds - - - -	167	61	
Other Complaints	129	23	
Total - - -	943	212	4

The fevers were chiefly from the five line-of-battle ships that came immediately from Europe in March. Upon their arrival they sent on shore one hundred and ninety-three men ill of fevers, only one with the flux, fifteen with the scurvy, and five with ulcers.

When

When these ships returned to Barbadoes in May, along with the rest of the fleet, the greater part of the sick were then also on board of them. By that time the flux and scurvy had broke out. The former prevailed chiefly in the *Terrible*; the latter in the *Intrepid*. That part of the fleet which we found on the station sent on shore a very small proportion of all the classes of complaints, except wounds.

Of the wounds, nineteen were amputations, of which there died nine, mostly of the locked jaw. There were forty-six scorched by gunpowder, of whom there died fourteen; so that, besides those who were killed outright, and those who died on board in consequence of accidents of this kind, before they could be sent to an hospital, about one-fourth of all the wounds, and the same proportion of all the deaths from wounds, at the hospital, was owing to this cause. This circumstance ought to induce commanders to take every precaution to prevent such accidents. In the subsequent part of the war they were less frequent, in consequence of that greater caution, and more accurate method



thod of working great guns, which were acquired by practice and experience\*.

In the account of the mortality, I have included only such as died before the 1st of January, 1781; for if any were carried off after that time, it was most probably by some incidental complaint. There were sixty-five of them at that time remaining, and they were chiefly men disabled by lameness waiting for a passage to England as invalids.

Out of the twenty-three that were killed by the fall of the house in the hurricane on the 10th of October, eight were of the number above accounted for; but these are not included in any of the classes of deaths.

The mortality among the men admitted at this time was greater than what occurred afterwards in any of the hospitals that I attended, except that at Jamaica. The principal cause of this was, that as the fleet was so much greater than had ever been known here before, there was not suitable accom-

\* See the last chapter of Part III.

modation for such numbers as it was necessary to send on shore, and we had not then fallen on the method of supplying refreshments to the men on board of their ships. The circumstance by which the men suffered most was, the great crowding which the want of room made necessary. There is here no public building appropriated for an hospital; so that this, as well as every thing else, being found by contract, and the number of sick being so much greater than it was usual to provide for, the whole was at this time conducted in a manner unfavourable to recovery.

It appears that the greatest mortality in any class of disease was that of the fluxes, of which the greatest number sent to hospitals are such as have languished for some time under this disease, in which state it generally proves fatal in the West Indies, in consequence of incurable ulcers in the great intestines, to which the heat of the climate, as well as the scorbutic habit and sea diet, is particularly unfavourable. But the whole of the mischief arising from it does not appear in the table; for it was the most apt of any disease to supervene upon other complaints.

plaints which were under cure at the hospital. It more particularly attacked those who were recovering from the scurvy, and was the cause of the greater number of deaths under this head in the table. It was found to be more contagious than fevers, either because the men's constitutions were more predisposed to it, or, perhaps, because the infectious matter of it being more gross and less volatile, it is not so readily dissipated by the heat of the climate; for, either from this, or some other circumstance, infectious fevers are not so easily generated, nor so apt to spread, as in Europe. That these fluxes were owing to infection may be inferred from hence, that, when men ill of the scurvy were cured on board of the ships they belonged to, they were not liable to this disease, neither did they prevail at these hospitals afterwards, when great care was taken to separate infectious diseases from the others.

The only regular hospital on this station is that at Antigua. This island being the seat of the royal dock-yard, there is an established hospital in time of peace as well as war. It so happened, that great fleets never  
came

came here to put their sick and wounded on shore, as at Barbadoes; so that the greater number of those received into it were from single ships that went to careen. As there was, therefore, less necessity for crowding, and as the slighter cases could be admitted, there was a less proportion of deaths here than at most of the other hospitals.

There were two other establishments for the reception of the sick and wounded on this station, but they were only temporary. These were at St. Lucia and St. Christopher's, where the men being received in great numbers at a time from large fleets, and as there were accommodations only for the most urgent cases, the mortality approached more nearly to that of Barbadoes. There died at St. Christopher's, in the years 1780, and 1781, in the proportion of one in six, and at St. Lucia, in the same time, one in five and a half, or two in eleven. The air of the hospital at St. Lucia was remarkably pure, and this degree of mortality was owing to the sick having been accommodated in tents and huts. In the two last years of the war, when an hospital was built, and regularly established, the mortality



lity was not much more than one half of this.

Some authors have endeavoured to form an estimate of practical skill from the different rates of mortality; but this is extremely fallacious; for the fatality of diseases will depend on their violence, the proportion of deaths being very different in cases that are slight, from what it is in those that are dangerous. We shall take a view, however, of the hospital at Barbadoes at another period, in which there seemed little or no difference in the violence of the disease, and when the superior success seemed to be owing to the hospital's not being so crowded, and to the better attendance and treatment of the sick. The following is a view of the diseases that were admitted in the last three months of the year 1782, the greater part of which were landed from the reinforcement of eight ships of the line that joined the fleet at Barbadoes in the beginning of December:

Fevers

DISEASES.	Admitted.	Died.	Proportion.
Fevers - - - - -	224	29	NEARLY { 8 3
Fluxes - - - - -	17	6	
Scurvy - - - - -	50	5	ONE IN { 10 2½
Ulcers - - - - -	25	10	
Other Complaints -	46	8	NEARLY { 6 6
Total - - -	362	58	

It happened on this, as on the former occasion, that none were sent on shore but such as were very ill, or had contagious complaints, the rest being provided with refreshments on board of their ships. There were no wounds at this time, but there was a greater proportion of fevers; so that the complaints, upon the whole, might be said to be equally dangerous, or nearly so. The mortality now was, however, considerably less, and this is to be imputed to the more favourable situation of the hospital, which I did not allow to be over-crowded; and the

M

men

men had all manner of justice done them in point of attendance and accommodation.

I shall give another example of the same kind in the hospital at Jamaica, when our fleet went there after the battle of the 12th of April. All the men accounted for here were landed from the fleet under Lord Rodney in May, June, and July, 1782\*.

DISEASES.	Admitted..	Died.	Proportion.
Fevers - - -	224	71	NEARLY ONE IN 3
Fluxes - - -	65	23	
Scurvy - - -	48	10	
Ulcers - - -	92	21	
Wounds - - -	70	18	
Other Complaints	40	18	2
Total - - -	539	161	3 $\frac{1}{2}$

This

\* In the year 1741, the fleet under Admiral Vernon was at Jamaica at the same time of the year; and the following

This uncommon degree of mortality was not owing to the bad air of the place, for Port Royal is naturally as healthy as most parts in that climate; nor was it owing to bad accommodations, or to neglect of any kind; but is imputable entirely to this circumstance, that the hospital being much too

following is the account of the men sent to the hospital in May and June.

D I S E A S E S.	Admitted.	Died.	Proportion.
Fevers - - - -	957	255	NEARLY ONE IN $\left\{ \begin{array}{l} 3\frac{1}{2} \\ 3\frac{1}{2} \\ 7\frac{1}{2} \\ 6 \end{array} \right.$
Fluxes - - - -	267	73	
Scurvy - - - -	314	41	
Other Complaints -	167	26	
Total - - -	1,703	395	4

There was on board of this fleet about two-thirds of the number of men that was on board of the fleet in 1782. I cannot ascertain how many died on board of the ships in Admiral Vernon's fleet; but the deaths at the hospital alone are somewhat more than what happened to our fleet both on board and at the hospital.



small, those only were sent to it who were very ill. There were at this time upwards of forty ships of the line at Jamaica, and an hospital, containing only three hundred beds, could afford but a very inadequate relief. Some officers are unwilling that any man should die on board of their ships; for fear of dispiriting the others; and many were sent to the hospital, in the most desperate stage of sickness, that they might there die.

There cannot be a stronger proof than this of the fallacy of judging of the success of practice by the proportion of the deaths; for the sick on this occasion were better accommodated, better provided for in every respect, and as regularly attended, as at any other period of my service in the West Indies, yet the mortality was greater than at any other time.

Having given instances of the common rate of mortality in hospitals in Europe and the West Indies, I shall next give examples of the success we had in North America,  
when

when the fleet was there in the autumns of 1780 and 1782.

ACCOUNT of the Sick landed at New York from the West-India Fleet, consisting of eleven Ships of the Line, in Autumn, 1780.

DISEASES.	Admitted.	Died.	Proportion.
Fevers - - - -	34	9	NEARLY ONE IN 4 9 11 6 8 9
Fluxes - - - -	229	27	
Scurvy - - - -	433	40	
Ulcers - - - -	47	8	
Other Complaints	82	10	
Total - -	825	94	9

ACCOUNT of the Sick landed at New York from the West-India fleet, consisting of twenty-six Ships of the Line, in Autumn, 1782.

DISEASES.	Admitted.	Died.	Proportion.
Fevers - - - -	104	14	7
Fluxes - - - -	131	14	9
Scurvy - - - -	617	30	20
Ulcers - - - -	74	10	7
Other Complaints	70	4	17
Total - - -	996	72	14

NEARLY ONE IN

The difference of mortality here, from what occurred in the West Indies, is partly imputable to climate, and partly to the smaller proportion of acute diseases. In the two accounts last stated, the difference in

favour of the latter seemed chiefly to arise from the superior attention to the sick, and the better treatment of them. It was mentioned before, that in autumn, 1782, at New York, they were better supplied, both at hospitals and on board of their ships, with every thing that could be wished, and that on this occasion almost every scheme I had proposed was realised. The extraordinary success in the scurvy was owing to the great quantities of vegetables that were supplied; for several fields of cabbages had been planted in the neighbourhood of the hospital for the use of the sick. This was owing to the humane attention of Admiral Digby, who had also caused cows to be purchased to supply the hospital with milk. Cleanliness, and the separation of diseases, were also strictly attended to; and I am persuaded that many of the scorbutic men were saved by keeping them separated from the fevers and fluxes; for it has been observed, that men recovering from scurvy are very susceptible of infection, particularly from the flux.



It appears, that the disease in which climate makes the greatest difference is the flux. It was observable, that though the dysentery at this time was more fatal on board of the ships at New York than in the West Indies, yet it was less so at the hospital. The cause of this seems to be, that the acute state of this disease, of which men die on board before there is time to remove them to an hospital, is more fatal in a cold climate; but when it becomes more protracted, which is the case with most of the cases sent to hospitals, they then do much better in a cold than in a hot climate.

I shall here subjoin an account of the numbers that were admitted, and who died, during the whole war, at the hospitals of the different ports at home and abroad, at which the fleets to which I belonged at any time touched.

	Admitted.	Died.	Proportion.
At Gibraltar - -	2,131	203	NEARLY ONE IN <div> <div>10</div> <div>5</div> <div>7</div> <div>7</div> <div>6</div> <div>6</div> <div>7½</div> </div>
Barbadoes - -	4,604	861	
Antigua - -	6,099	914	
St. Lucia - -	3,363	478	
St. Christopher's	853	142	
Jamaica - -	10,088	1,672	
New York - -	17,880	2,179	
Total - -	45,018	6,449	7

I have been able to calculate the numbers of deaths from disease in this great fleet, both on board and at hospitals, during the period of my own service, which was three years and three months, and they amounted to three thousand two hundred \*, independent

\* I was enabled, after coming to England, to ascertain the deaths in that part of the squadron from which I happened at any time to be absent, by having leave from the

dent of those that were killed and died of wounds.

There died of disease in the fleet I belonged to, from July 1780 to July 1781, about one man in eight, including both those who died on board and at hospitals\*. But the annual mortality in the West-India fleet, during the last year of the war, that is, from March 1782 to March 1783, was not quite one in twenty† This difference

the Navy Board to inspect the ships' books deposited at their office.

\* See Appendix to Part II.

† The mortality of the army in the West Indies is much greater; for it appears by the returns of the War Office, that there died in the year 1780, two thousand and thirty-six soldiers, which being calculated by the numbers on the station, and those who arrived in the convoy in March and July, the annual mortality is found to be one in four. The greatness of this mortality will appear in a still stronger light, when it is considered that those who serve in the army are the most healthy part of the community. When I was on a visit at the encampment at Coxheath in the year 1779, I was politely favoured with a sight of the returns, both of the general officers and physician, and it appeared that in an army of ten thousand and eighty-nine men, there died, from the 10th of June to the 2d of November, forty-three, exclusive of twelve who died of small-pox. This being calculated,

rence was partly owing to the general increase of health in fleets as a war advances, partly to some improvements in victualling, and partly to better accommodations as well as regulations in what related to the care of the sick.

Though the mortality in fleets in the West Indies is, upon the whole, greater than in Europe, yet it has so happened, that, in the late war, the fleet at home has, at particular periods, been considerably more sickly than that in the West Indies was at any one time. I was informed by Dr. Lind, that, when the grand fleet arrived at Portsmouth in November 1779, a tenth part of all the men were sent to the hospital. It appears\*, that in the years 1780 and 1781, a period at which the fleet in the West Indies was most sickly, the medium of the numbers on the

calculated, is equal to an annual mortality of one in a hundred and nine; and it was not half so much in the encampment of the former year. It appears, by Mr. Simpson's tables, that the mortality of mankind in England, from the age of twenty to forty-five, which includes the usual age of those who serve in the navy and army, is one in fifty.

\* See Table II.



sick list was one in fifteen, and many of these were very slight complaints; whereas, in the fleet alluded to in England, the diseases were mostly fevers, and so ill as actually to be sent to the hospital. It appears likewise, that there was the greatest proportion of sick in our fleet when it was on the coast of America in September 1780\*. This difference is owing to the greater prevalence of the ship fever, and of the scurvy, in a cold than in a hot climate.

It has appeared from † our reasonings concerning the nature of medical investigation, that important practical truths can be ascertained only by averages expressive of the comparative results of numerous individual facts. In order, therefore, to illustrate still farther the subject under consideration, there is inserted in the present edition of this work, a table of the numbers of admissions and deaths at Haslar and Plymouth hospitals for the last forty-three years, divided into periods of ‡ peace and war.

The

\* See Table II.

† See Preface.

‡ Although in this account it is reckoned a period of peace from the year 1763 till 1777, both years included, yet

The sick and wounded of the Navy were first received into Haslar hospital in the year 1754, and it was completed about two years afterwards. Plymouth hospital began first to be occupied in 1760, but was not completed till 1764. It is only subsequent to this that the two hospitals can be fairly compared, and it is during war that this comparison seems most just and most interesting, as the cases are then most similar, and it is less likely that at that time any cases will be sent for cure but such as are fit objects for an hospital.

yet there was in that time a considerable armament in 1771, in consequence of a misunderstanding with the court of Spain regarding the Falkland Islands, and before the commencement of the war with France in 1778, there had been small naval armaments from the beginning of the American disturbances, for the two or three preceding years. And though it is reckoned a period of peace from 1783 till 1793, yet in that time, though there was no actual war, there were armaments in 1787, 1790, and 1791, in consequence of misunderstandings with several foreign powers.

TABLE,

TABLE, shewing the Number of Men admitted, and who have died at Haslar and Plymouth Hospitals, from the Year 1755 to the Year 1797, distinguished according to the Periods of Peace and War.

	HASLAR.		PLYMOUTH.	
	Received.	Died.	Received.	Died.
* From 1755 till 1763, both years included	34,935	1,869 I. in 18.6	25,879	1,691 I. in 15.3
From 1764 till 1777, both years included	31,389	1,004 I. in 31.2	11,625	454 I. in 25.6
From 1778 till 1782, both years included	52,503	3,137 I. in 16.7	27,632	1,109 I. in 24.9
From 1783 till 1792, both years included	25,065	1,157 I. in 21.6	25,221	1,309 I. in 19.2
From 1793 till 1797, both years included.	32,498	2,262 I. in 14.3	21,277	† 861 I. in 24.7

It

\* The records of the office from which this abstract has been taken, are wanting from August 1757 till February 1759, and from May 1761 till April 1762. This, however, does not affect the proportional number of admissions and deaths, and the relative state of the two hospitals.

† Forty-one deaths reported in the returns of Plymouth for 1796 are not included, being men sent dead on shore for interment from the Amphion frigate, which  
blew

It appears, then, from the annexed table, that during the late and the present wars, there has been less mortality at Plymouth than at Haslar. These two institutions are equally well supplied with accommodations, diet, and attendance. They are both kept in a state of the most perfect cleanliness and good order, so that in all points they are justly considered as models of what hospitals ought to be, and are perhaps inferior to none in every advantage attainable by such institutions. It is presumable, therefore, that the difference of mortality is owing to the difference in point of air. Plymouth has some advantage in respect to climate, being considerably warmer in winter, which is of great advantage to those, more particularly, who are affected with pulmonic complaints, who constitute a considerable proportion of the sick. It is also situated on a drier soil. But the chief difference in these two hospitals consists in the size and distribution of

blew up while at anchor in the Sound. Those who die on board of their ships, both at Portsmouth and Plymouth, are buried at the hospitals, and included in the returns of dead; but as all the cases of danger are usually sent to the hospitals, the number of those who die on board is usually but small, and though this affects somewhat the general rate of mortality as stated above, it does not alter the relative proportion of it at these two places.

the



the buildings. Haſlar hoſpital conſiſts of one great center building, and four pavilions running backwards from each corner of it. Theſe are placed in pairs, ſtanding parallel and very cloſe to each other lengthwiſe, ſo as to intercept the free courſe of the air. It is calculated to hold with eaſe eighteen hundred men. Plymouth hoſpital conſiſts of twelve ſeparate ſimilar and equal buildings, ranged in a large ſquare, with wide intervals between each. Of theſe twelve, however, ten only are occupied by the ſick. It is calculated to hold with eaſe twelve hundred men. M. Tenon, a French phyſician, who by his king's order had made a comparative review of moſt of the hoſpitals in Europe, with a view to the reformation of thoſe in Paris, and viſited this one in 1787, gives the preference to it over all others, in regard to the judicious conſtruction and diſtribution of the buildings. The wards in both hoſpitals are nearly of the ſame dimensions, and there is an allowance of about eight hundred cubic feet for each patient, in the wards where the ſick and wounded are ſo ill as to be confined. Leſs ſpace is allowed for convaleſcent and chronic caſes. The ſuperior ſalubrity of  
Plymouth,

Plymouth, therefore, in so far as regards the building, seems to consist in there being fewer apartments under the same roof, so that there is a smaller mass of foul air to be carried off, and in the several buildings not screening each other from the free current of the external air.

It is difficult for those whose researches and reflections have not led them to consider this subject, to conceive the great influence of even a small difference in the purity of the air, breathed by those who labour under sickness and wounds. This is still more difficult to conceive, when it is observed how little these varieties affect people in health. One of the most striking proofs of this, is the great difference in the success of the treatment of compound fractures, and other violent injuries, in private houses, from what it is at an hospital. The superior effect of the air of the country over that of the town, in restoring the sick and convalescent, is another fact which ought to be deeply impressed on the minds of those who plan edifices and conduct institutions for the reception of the sick and wounded, in order to serve

as an illustration of the value of fresh air\*.

But the most remarkable point of comparison exhibited in this table, is that of the late war with France, which lasted five years, with the five by-past years of the present war. It appears that in these two hospitals alone, there were upwards of twenty-seven thousand more patients admitted in the former than the latter period, though a † greater naval force is now kept up than was ever known in this country, and a greater proportion of it on home service than in the late war. The principal causes of this seem to be ; 1st. That the navy at the commencement of this war was manned with less impressing than on the like occasions in former wars. The foul air produced by the crowding, and bad accommo-

\* See diseases of the army by Sir John Pringle, to whom the world is much indebted for placing this subject in a strong and instructive point of view, by representing hospitals themselves when ill aired, to be one of the principal causes of mortality, and a great source of infection.

† The number of seamen and marines now voted by parliament is 120,000. The greatest number in the late war was 100,000, and in the preceding war 88,000.

dation

dation attending the methods of securing impressed men, previous to their distribution, has already been stated as the principal cause of the general infection prevailing in the beginning of wars. 2dly, The greater observance of cleanliness and dryness, and the stricter enforcement of discipline, in consequence of the conviction now entertained by officers, of the indispensable necessity of these to the health of the men under their command. 3dly, The general use of lemon juice, so judiciously and liberally allowed to ships at sea for the three last years. 4thly, The late increase of encouragement to surgeons, and the operation of the regulations established and put in force by the medical board of the navy.

In consequence of the great diminution of sick at Haslar hospital, and the general and steady state of health of the navy, not only at home but on foreign stations, there has just now (August 1798) a reduction been made of one third of the establishment there. This is in itself a considerable saving, but the saving in the maintenance of the sick, and replacing those who die or become unserviceable, is still more considera-



ble, not to speak of advantages of still higher moment. And at this crisis, when every one must see and feel, that our hourly security, and perhaps our existence, depends on the unremitting exertions and judicious management of our naval force, it cannot but constitute the most pleasing matter of contemplation to the nation at large, as well as to the government, and particularly that branch of it which presides over the navy, to behold at once the great interests of humanity, of national defence, and public œconomy thus effectually promoted.

The greater rate of mortality in this than in former wars at both hospitals, seems chiefly to be owing to the better selection of the sick, more cases of a slighter nature being now cured on board, in consequence of the additional means afforded to surgeons of doing so, and, perhaps, a stricter attention at hospitals respecting admissions, their general discipline having been of late improved.

The two places at which the greatest number of sick are put on shore, next to these two hospitals, are Sheerness, at the mouth of the river Thames, and Deal, adjoining to the Downs. The latter has for  
the

the last three years been on the establishment of a royal hospital. The number admitted at the former during the first period of war mentioned above, was 4,885, of whom there died 192, that is one in 25.4. and at the latter, 4,982, of whom there died 389, that is one in 12.8. The small proportion of mortality at this time at Sheerness, which is one of the most unhealthy spots in England, and affording very bad accommodations, cannot be accounted for otherwise than by the slowness of the cases landed at that port at that period. During the five past years of the present war, there have been admitted at that\* place, 3,724, of whom 250 died, or 1 in 14.8; at Deal, 3,396, of whom 170 died, or 1 in 19.9†.

Thus

\* The sick quarters at this place were abolished a few months before the end of this period, and the sick have since that time been accommodated in an hospital ship.

† The following is an account of the mortality at some of the principal civil hospitals. Except that of St. Thomas's, which I extracted myself, on an average of the twelve years during which I was one of the physicians, this account is extracted from a work entitled "*Memoires sur les Hôpitaux de Paris.*—A. Paris, 1788." Page 278.

The Royal Infirmary of Edinburgh - 1 in 25

The General Hospital at Vienna, fluctu-

ating from - - - - 1 in 12.5

to - - - - 1 in 13.2

Thus we see that the comparison in point of mortality is greatly in favour of the hospitals in England. This is owing to the greater regularity, and the better accommodation and diet, which an hospital at home admits of, as well as to the difference of climate. It has also been mentioned, that, on most occasions, the hospitals I attended abroad were so limited as to contain only the worst cases, in consequence of which there would of course be a greater proportional mortality than in the great hospitals of England.

The following is an account of the whole loss of lives from disease, and by the enemy \*, in three years and three months, in the fleets and hospitals with which I was connected :

Died

\* None are comprehended but those who were killed or wounded in battles in which the whole fleet was present, this account not including those who fell in single actions in frigates or other ships.

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Hotel de St. Esprit, at Rome	-	-	1 in 11
Hotel de la Chartre at Paris	-	-	1 in 7
Hotel Dieu at Paris	-	-	1 in 4.5

N. B. The mortality is still greater if child-bed women and infants are included.

Hotel Dieu et Rouen	-	-	1 in 10
St. Thomas's Hospital in London	-	-	1 in 13.5

Died of disease *	-	-	3,200
Killed in battle	-	-	648
Died of wounds	-	-	500
Total †	-		4,348

\* It would appear, that, anciently, though the slaughter in battle was greater than in modern times, yet that disease was still more destructive than the sword. One of the oldest testimonies to this purpose is in the History of Alexander's Expedition, by Arrian — *τους μὲν ἐν ταῖς μάχαις ἀπολωλεσασιν, οἱ δὲ ἐκ τῶν τραυμάτων ἀπομαχοὶ γεγεννημένοι, οἱ πλείους δὲ νοσῶ ἀπολωλεσαν.* — Arrian. Hist. Alex. Exped. Lib. v. cap. 26.

† Upwards of three thousand were also lost at sea in ships of war belonging to the same fleets in the hurricane of October 1780, and in the storm in September 1782, in which the Ville de Paris and the other French prizes were lost on their passage to England.

## P A R T II.

### Of the Causes of Sickness in Fleets, and the Means of Prevention.

#### I N T R O D U C T I O N.

**I**N the year 1780 I printed a small treatise for the use of the fleet, containing general rules for the prevention of sickness; and this part of the work is chiefly taken from it.



My own opportunities of experience, as exhibited in the preceding Part, have been sufficiently extensive to suggest many observations on this subject; but as my object is utility, rather than the praise of originality, I shall not confine myself to these. Great part of what is to be advanced is taken from books \* and conversation, as well as my own experience, my design being to exhibit a concise view of all the discoveries on this subject that have come to my knowledge. I have assumed nothing, however, from mere report or testimony, having had opportunities, from my own observations, of verifying or disproving the assertions of others.

More may be done towards the preservation of the health and lives of seamen than is commonly imagined; and it is a matter not only of humanity and duty, but of interest and policy.

\* The authors from whom I have borrowed have been chiefly Dr. Lind and Capt. Cook. To the former we are indebted for the most accurate observations on the health of seamen in hot climates, and on the scurvy. Of the improvements made by the latter, an excellent compendium may be seen in Sir John Pringle's Discourse before the Royal Society, on the occasion of adjudging a prize medal to Capt. Cook for his paper upon this subject in the year 1776.

Towards the forming of a seaman a sort of education is necessary, consisting in an habitual practice in the exercise of his profession from an early period of life ; so that if our stock of mariners should come to be exhausted or diminished, this would be a loss that could not be repaired by the most flourishing state of the public finances ; for money would avail nothing to the public defence without a sufficient number of able and healthy men, who are the real resources of a state, and the true sinews of war.

In this view, as well as from the peculiar dependence of Britain on her navy, this order of people is truly inestimable ; and even considering men merely as a commodity, it could be made evident, in an œconomical and political view, independent of moral considerations, that the lives and health of men might be preserved at much less expence and trouble than what are necessary to repair the ravages of disease.

It would be endless to enumerate the accounts furnished by history of the losses and disappointments to the public service from the prevalence of disease in fleets. Sir

Richard

Richard Hawkins, who lived in the beginning of the last century, mentions, that in twenty years he had known of ten thousand men who had perished by the scurvy. Commodore Anson, in the course of his voyage of circumnavigation, lost more than four-fifths of his men chiefly by that disease. History supplies us with many instances of naval expeditions that have been entirely frustrated by the force of disease alone: that under Count Mansfeldt in 1624; that under the Duke of Buckingham the year after; that under Sir Francis Wheeler in 1693; that to Carthagena in 1741; that of the French under D'Anville in 1746; and that of the same nation to Louisbourg in 1757\*.

\* In the late war, sickness alone was not the cause of want of success in any instance, except in the last action in the East Indies, in which so many men were ill of the scurvy, that there were not hands enow to manage the guns.

There is another fact in history, which, though not so applicable to this subject as those above recited, forcibly evinces how important a study the health of men ought to be in military affairs. When Henry V. was about to invade France, he had an army of fifty thousand men; but owing to a sickness which arose in the army, in consequence of some delays in the embarkation, their number was reduced to ten thousand at the battle of Agincourt. The disease of which they chiefly died was the dysentery.—RAPIN.

That



That the health of a ship's company depends in a great measure upon means within our power, is strongly evinced by this, that different ships in the same situation of service enjoy very different degrees of health. Every one who has served in a great fleet must have remarked, that out of ships with the same complement of men, who have been the same length of time at sea, and have been victualled and watered in the same manner, some are extremely sickly, while others are free from disease. Is it not naturally to be inferred from hence, that the health of men at sea depends in a great measure upon circumstances within the power of officers, and, indeed, upon their exertions, much more than medical care \*?

It has appeared in the preceding part of this work, that the diseases most prevalent among seamen are fevers, fluxes, and the scurvy. These are indeed some of the most

\* It is not meant by this to insinuate that every commander is absolutely accountable for the health of his ship's company, and censurable when they are sickly; for this may depend on his predecessor in command, or a stubborn infection may have prevailed from the original fitting out or manning of the ship, which he may not have superintended.

fatal



fatal that can attack the human body; but there is a numerous tribe of complaints, which are also some of the most severe scourges of human nature, from which they are in a manner entirely exempt. — These are the diseases to which the indolent and luxurious are subject, and which so far embitter their life as to render their portion of worldly enjoyment nearly on a level with that of the poor and laborious. The diseases alluded to are chiefly the gout, stomach complaints, hypochondriac and nervous disorders. In all countries it is the better sort of people that are most subject to these; for they are owing to the want of bodily exercise, to the great indulgence of the senses, and a greater keenness and delicacy in the passions and sentiments of the mind. Man being formed by nature for active life, it is necessary to his enjoying health that his muscular powers should be exercised, and that his senses should be habituated to a certain strength of impression. Animal and vegetable nature may be aptly enough compared to each other in this respect; for a tree or plant brought up in a greater degree of shelter and shade than what is suitable to its nature, will be puny and sickly;

sickly; it will neither attain its natural growth nor strength of fibre, nor will it be able to bear the influence of the weather, nor the natural vicissitudes of heat and cold to which it may be exposed.

It is to be remarked, however, that exercise and temperance may be carried to excess, and that in these there is a certain salutary medium; for when labour and abstinence amount to hardship, they are equally pernicious as indulgence and indolence. This is strongly exemplified in seamen; for, in consequence of what they undergo, they are in general short lived, and have their constitutions worn out ten years before the rest of the laborious part of mankind. A seaman at the age of forty-five, if shewn to a person not accustomed to be among them, would be taken by his looks to be fifty-five, or even on the borders of sixty\*.

The most common chronic complaints

\* Οὐ γὰρ ἐγὼ γέ τι οἶδα κακώτερον ἄλλο θαλάσσης,  
Ἀνδρά τε συγχεῖναι, εἰ καὶ μάλα κακότερος εἴη.

OMHP. OΔΥΣ. Θ.

Dire is the ocean, dread in all its forms!

Man must decay, when man contends with storms.

POPE.

which

which a long course of fatigue, exposure to the weather, and other hardships, tend to bring on, are pulmonary consumptions, rheumatisms, and dropfies. It is also to be considered, that these complaints, particularly the last, are farther fomented by hard drinking, which is a common vice among this class of men, and they are led to indulge in it by the rigorous and irregular course of duty incident to their mode of life.

With regard to gout, indigestion, hypochondriac complaints, and low spirits, there is something in hard labour of every kind that tends to avert them, and particularly in that rough mode of it peculiar to a sea life. There is also something in the harsh sensations from the objects which seamen are in use to see, hear, and handle, which so modifies their constitutions and hardens their nerves as to make them little liable to what may be called the diseases of excessive refinement, such as those above mentioned. I have, indeed, met with such diseases at naval hospitals; but I always remarked that they were in landsmen who had been pressed, and who had been bred to sedentary and indolent occupations.

The



The diseases above enumerated, as well as most other chronic complaints, being the offspring of indolence and luxury, while fevers and feverish complaints fall equally on all ranks and descriptions of men, it was a saying of some of the ancients, that acute diseases were inflicted by heaven \*, whereas chronic diseases were of man's own creation. But I shall endeavour in the course of this work to evince, that, with re-

\* Wherever causes are obscure, superstition naturally ascribes them to some preternatural influence; and what seemed farther to have encouraged this, anciently, was, that violent epidemics occurred most frequently in camps and at sieges where great political conjunctures were likely to arise, in which superior powers were supposed to interest themselves. Thus we read in Homer of fatal diseases being sent as punishments by the gods. But the pestilential diseases so often mentioned by poets and historians as prevailing in cities and armies, were probably nothing else but fevers, produced partly perhaps by the scarcity and bad quality of provisions, but probably still more by corrupted human effluvia, which was very apt to be produced by the want of personal cleanliness, to which the mode of cloathing among the ancients would more particularly subject them, especially in camps and besieged towns. The sea scurvy might also sometimes pass under this name, as it sometimes is produced by famine, as was the case in Paris, and other parts of France, in the year 1699. See Mem. Acad. Scienc.

gard



gard to seamen at least, acute diseases are as much artificial as any others, being the offspring of mismanagement and neglect; with this difference, that they are imputable not so much to the misconduct of the sufferers themselves, as of those under whose direction and protection they are placed.

If I were to add any other complaint to the three already mentioned, as most prevalent, and peculiar to a sea life, it would be those foul and incurable ulcers which are so apt to arise at sea, particularly in a hot climate. The slightest scratch, or the smallest pimple, more especially on the lower extremities, is apt to spread, and to become an incurable ulcer, so as to end in the loss of a limb. The nature of the diet, and the malignant influence of tropical climates, both conspire in producing them\*.

The

\* Though the venereal disease is less frequent in the sea service than in other situations, owing to the opportunities of infection being more rare; yet there is reason to think that it may have owed its origin to a sea life. It is now agreed by those who have fully considered the subject, that this disease was not found among the natives of the new world at its first discovery, for no  
such

The diseases most frequent and prevalent at sea have this advantage, that they are more the subjects of prevention than most others, because they depend upon remote causes that are assignable, and which increase and diminish according to certain circumstances, which are in a great measure within our power.

The prevention of diseases is an object as much deserving our attention as their

such fact is mentioned in the narrative of Columbus or his son. But it seems probable that Europeans, after making longer voyages than they had ever before been accustomed to, and living long upon corrupted and unnatural food, might, under such a peculiar concurrence of circumstances, engender a new disease when they return into port; more especially when they came to be connected with the females of a new race of people, so different in their constitutions and mode of life. This is corroborated by what has happened in our own times in the islands of the South Sea, in which this disease was not known before they were discovered, but appeared upon the arrival of the Europeans, though the ships crews were declared by the surgeons to be free from it. It is also contrary to common experience that those forms of the disease which are infectious, that is to say, gonorrhœa and chancres, should exist so long; for those forms of the disease in which it exists for a great length of time, that is to say, sore throat, blotches, and nodes, are now known not to be infectious.

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cure;

cure; for the art of physic is at best but fallible, and sickness, under the best medical management, is productive of great inconvenience, and is attended with more or less mortality. The means of prevention are also more within our power than those of cure; for it is more in human art to remove contagion, to alter a man's food and cloathing, to command what exercise he is to use and what air he is to breathe, than it is to produce any given change in the internal operations of the body. What we know concerning prevention is also more certain and satisfactory, in as much as it is easier to investigate the external causes that affect health, than to develope the secret springs of the animal œconomy.

This part of the work, therefore, is chiefly addressed to those who direct the navy either in a civil or military capacity; for the general health of ships depends so much upon the victualling and manning in the first instance, and, afterwards, on the degree of discipline and order which are kept up, that I am persuaded that a certain degree of attention on their part would  
almost

almost entirely eradicate disease from our fleets.

Several remarks in this part of the work will be found so obvious, that it might seem superfluous to mention them. But it has been my intention to omit nothing that I have heard of or observed as a matter of ascertained utility, and, I believe, the most experienced will find either something new, or what they had not before sufficiently attended to. Though the design of it is that of being extensively useful, yet my trouble would be compensated, should it prove the means of health and comfort to a single ship's company; nay, I should not repent my labour, could I enjoy the conscious certainty of its being the means of saving the life of one brave and good man.

The prevention of disease has relation only to the external causes that affect health, and I shall consider these under the four heads of

I. AIR,  
II. ALIMENT,

III. EXERCISE,  
IV. CLOATHING.



## C H A P. I.

## A I R.

**U**NDER this head will be considered, not only the natural state of the air of the atmosphere in point of heat and cold, moisture and dryness, purity and corruption, but also the different artificial impregnations of it from the holds or other parts of a ship, or from the persons of men who have been neglected in point of cleanliness.

The common air of the atmosphere at sea is purer than on shore, which gives to a sea life a very great advantage over a life at land. This advantage is still greater in the tropical regions, where the land air, especially such as proceeds from woods and marshes, is so fatal, and where the heat is also considerably less at sea than on shore. But this superior purity of the air at sea is more than counterbalanced by the artificial means of propagating diseases on board of a ship. Since a sea life, however, has this great natural advantage to health, the causes of disease peculiar to it are chargeable rather

ther to the mismanagement of men than to any thing unavoidable in nature ; and we are from this encouraged to exert our endeavours in removing them.

The effects of land air, however, are not to be neglected by those who are studious of preserving the health of a ship's company, for seamen are exposed to it in various ways while they are in harbour ; and this we shall treat of, after considering the influence of simple temperature.

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## S E C T. I.

### On the REGULATION of HEAT and COLD.

THAT property of the living body by which it not only generates heat, but maintains it at a fixt point, whatever the external temperature may be, is one of the most essential and peculiar energies belonging to animal life. While dead matter tends invariably to an equilibrium of temperature with contiguous bodies, the most

superficial observer must have remarked, that in the common course of nature, our bodies are constantly of a greater degree of heat than the surrounding air. It is found, by accurate observations on the thermometer, that in health this heat is not only always the same in the various degrees of heat below it, but it has been ascertained, by the observations of Governor Ellis\*, and the experiments of Dr. Fordyce † and Dr. Blagden, that it remains the same even when the external air is of a higher temperature than that of the living body.

As the heat of the body is carried off or retained in various degrees according to that of the surrounding medium, and as the generation of heat is one of the most material functions of life, it is presumable, *a priori*, that the efforts which it makes, in thus accommodating itself to the various conditions, and the changes, more or less sudden, of the atmosphere, will have an important influence upon health. This is in fact found to be so, for extremes and sudden changes

\* Phil. Trans. Vol. L.

† Phil. Trans. Vol. LXV.

of temperature are hostile to health, and there is a certain medium found to be most salutary and agreeable, which in our climate is about the middle of the range between the freezing point and the heat of the human body. Though deviations, if they are to a considerable degree either above or below this, are unpleasant to the sensations, and unfavourable to the functions of life, yet more inconvenience and detriment arises from the former than from the latter, as we have it more in our power, by artificial means, to counteract extremes of cold than of heat.

And in consequence of this principle in the animal œconomy, whereby the same temperature is maintained in a living body whatever the external heat may be, it is evident, that the energy by which animal heat is generated must vary with the external temperature, and as this, like every other function, goes on best when subject to steady habits, it is rational to presume, not only that sudden changes in the heat of the external medium, must impose a degree of violence and irregular action on the generating power of heat ; but that this, not



readily accommodating itself to quick extremes, a preternatural accumulation or abstraction of heat may be expected to take place. Such changes are accordingly found to be unfriendly to health, and are ascertained by observation to be among the most frequent causes of disease. Sudden impressions of cold are the most common occasional cause of all febrile affections, particularly those of the inflammatory kind. Transitions the reverse of this are equally pernicious, and are so in proportion to their extent, for the inhabitants of the north of Europe are much more subject to the fatal diseases of tropical climates than those of the south of Europe. It is probably owing in part to the suddenness of the transition, in consequence of the greater quickness of the passage, that the West Indies is so much more fatal to those newly arrived from Europe, than the East Indies, to which there is a long passage through various intermediate climates. The heat in most of our tropical settlements in the East, is greater than in those of the West, though the former are much less unhealthy.

One of the most important points in the treatment of the sick, is to reconcile warmth with ventilation. When artificial warmth cannot be procured, as is frequently the case at sea, a dilemma arises whether to run risks by the exclusion of fresh air, or by the free admission of it. In case the prevailing diseases should be those continued fevers which commonly arise in ships, and depending on infection, there will be most risk from excluding the air; if they should be pulmonic and rheumatick affections, there will be most risk from the free admission of it. There is great room for the exercise of judgment and discretion in the management of this matter.

The great advantage of fires consists not only in obviating these evils, by maintaining a salutary and agreeable warmth, but in promoting dryness, in exhaling and dissipating infectious matter, and in procuring a perpetual change of air, by causing an ascent of it in consequence of rarefaction.

Under this head the influence of the sunbeams falls to be considered. These have no proper heat in themselves, and produce it

it either by their refraction in passing through transparent bodies of different densities, or by impinging on opaque substances, such as our bodies. It is usual in registers of the weather to overlook the heat arising from the direct rays of the sun, and only to record that in the shade. The effect of these rays however is very great. I found at sea in the West Indies, that they raised the thermometer fourteen degrees higher than it stood in the shade or in the sea, the heat of which is there commonly the same with that of the air. They excite heat with greater suddenness as well as greater intensity than the air, which is a very bad conductor of heat, and therefore both imparts and abstracts it very slowly. The direct rays of the sun not only produce that sudden and fatal affection called the *Coup de Soleil*, but it has been remarked, in the first Part of this work, that it is the exposure to them that is one of the principal causes of the very fatal diseases of newly arrived Europeans. There can be no doubt, but that fatigue and intemperance conspire to the same effect, but these do not produce the like diseases in temperate or cold climates. It is evident from this, why women are so  
much

much less subject to the fevers of tropical climates than men. That this is not merely owing to something in the constitution peculiar to their sex, is proved by another striking fact. The prisoners of war who were not under the influence of disease at their capture, were observed to remain exempt from the epidemic fevers of the West Indies. This has been particularly conspicuous in the years 1794 and 1795, during which the most deplorable ravage ever known was made in the great armaments sent to the West Indies, yet the prisoners of war remained exempt from it, according to the testimony of those who had the custody of them at Jamaica and Antigua. There can be no doubt, that the peculiarity of situation to which this is principally imputable is shelter from the sun. It is true, the French, particularly those of the southern provinces, are not so subject as we to the tropical epidemics, and prisoners are not exposed to fatigue and intemperance; but these circumstances are not adequate to account for the great exemption these prisoners enjoyed\*.

In

\* The ancients had an opinion that nothing was so hurtful to health as the direct rays of the sun. Tacitus  
has



In the course of the service which was the subject of the first Part of this book, there has been abundant practical proof of the pernicious effects of the direct rays of the sun, and of the great advantage of \* avoiding them as much as possible.

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## S E C T. II.

Of the noxious Effects of LAND AIR in particular Situations.

**A**LL the diseases incident to a fleet, except the scurvy, are more apt to arise in a harbour than at sea, and particularly the violent fevers peculiar to hot climates. There

has the following observation with respect to Rome, when it was rebuilt after the conflagration perpetrated by Nero. *Erant tamen qui crederent veterem illam formam salubritati magis conduxisse quoniam angustia itinerum et altitudo tectorum non perinde solis vapore perirentur. Ut nunc patulam latitudinem et nulla umbra defensam graviore æstu ardescere.* Tacit. Annal. lib. xv. This, however, seems to be carrying this principle too far, especially for the climate of Italy, for the harm arising from the greater exposure to heat, would be more than compensated by the advantage of freer perspiration and better ventilation.

\* See Page 131.

are generally woods and marshes adjacent to the anchoring places in the West Indies, and the men are exposed to the bad air proceeding from thence, either in consequence of the ship's riding to leeward of them, or of people's going on shore on the duties of wooding and watering, or on military service. Instances of this, without number, might be adduced from the accounts of voyages to all the tropical countries. Our fatal expeditions to the *Bastimentos*, and to *Carthage*, in former wars, are striking proofs of it; and we have seen the same effects, though in a much less degree, while the fleet was at *Jamaica* in 1782.

I have known a hundred yards in a road make a difference in the health of a ship at anchor, by her being under the lee of marshes in one situation, and not in the other \*. Where people at land are so situated,

\* If the experiments of modern philosophy are to be depended on, they go a certain way to account for the unwholesomeness of air from woods in hot climates, and in wet weather; for *Dr. Ingenhousz* found that the effluvia of plants in the night time, and in the shade, are more poisonous in hot than in cold weather; but though there is a salubrity in the effluvia in sunshine (which has since

ated, as not to be exposed to the air of woods and marshes, but only to the sea air, they are equally healthy as at sea. There was a remarkable instance of this on a small island, called Pigeon Island, formerly described, where forty men were employed in making a battery, and they were there from June to December, which includes the most unhealthy time of the year, without a man

since been found to be owing to the extrication of oxygen by the decomposition of water,) yet the intensity of the heat does not add to this salubrity. He found also that vegetables, when wet, yield an unwholesome air.

It is difficult to ascertain how far the influence of vapours from woods and marshes extend; but there is reason to think that it is to a very small distance. When the ships watered at Rock Fort, they found that if they anchored close to the shore, so as to smell the land air, the health of the men was affected; but upon removing two cables length, no inconvenience was perceived. I was informed of the following fact, in proof of the same, by the medical gentlemen who attended the army in Jamaica:—The garrison of Fort Augusta, which stands very near some marshes, to which it is to leeward when the land wind blows, was yet remarkably healthy; but it became at one time extremely sickly upon the breaking in of the sea in consequence of a high tide, whereby the water which was retained in the hollows of the fort produced a putrid moisture in the soil, exhaling a vapour offensive to the smell, and with all the noxious effects upon health commonly arising from the effluvia of marshes.

\*

dying,

dying, and with very little sickness among them, though they worked hard, lived on salt provisions, and had their habitations entirely destroyed by the hurricane. During this time near one half of the garrison of St. Lucia died, though in circumstances similar in every respect, except the air of the place, which blew from woods and marshes.

The duties of wooding and watering are so unwholesome, that negroes, if possible, should be hired to perform them. In general, however, the employing of seamen in filling water and cutting wood is unavoidable, but it should be so managed as not to allow them, on any account, to stay on shore all night; for, besides that the air is then more unwholesome, men, when asleep, are more susceptible of any harm, either from the cold or the impurity of air, than when awake and employed. The danger of sleeping in the Campania of Rome, and on the road from thence to Naples, is a fact well known in Europe, and is farther in proof of what is here advanced.

As the service necessarily requires that men  
should



should be on shore more or less; however unwholesome the air may be, means are to be used to prevent its pernicious impressions on the body. Certain internal medicines, such as bitters, aromatics, and small quantities of vinous liquors, tend to preserve the body from its bad effects. Of the bitters, Peruvian bark is, perhaps, the best; and there is a well-attested instance of its efficacy in the account given by Mr. Robertson of a voyage in the *Rainbow* to the coast of Africa; and by the same means Count Bonnaval and his suite escaped sickness in the camps in Hungary, while half of the army were cut off by fevers. In consequence of Mr. Robertson's representation of the effects, of bark in curing and preventing the fevers of that climate, the ships of war fitted out for the coast of Guinea have been supplied with it gratuitously, and Government would find its account in extending this bounty to all the tropical stations\*.

We have seen, in the former part of this work, that the fever produced by the impure air of marshes may not appear for many days after the noxious principle, whatever it

\* It was extended to the West Indies in 1796.

is, has been imbibed ; men having been sometimes seized with it more than a week after they had been at sea. It naturally occurs, therefore, that something may be done in the intermediate time to prevent the effects of this bad air ; and nothing is more adviseable than to take some doses of Peruvian bark, after clearing the bowels by a purgative. Some facts, related in the first part of this work, shew that an interval of ten days or a fortnight may elapse between the imbibing of the poison and its taking effect. And, in order to guard against the diseases of this climate in general, it would be more proper to take some large doses of bark once in either of these periods, than to make a constant practice of taking a little, as I have known some people do, by which they may also render their body in some measure insensible to its good effects. I knew a physician of some eminence in the West Indies, who always enjoyed uninterrupted health, and he imputed it to his taking from half an ounce to an ounce of bark every change and full of the moon, as he thought that fevers of the intermitting and remitting kind, were more apt to occur at these periods. Whether this notion be well

founded or not, the practice is proper, upon the other principle that has been mentioned, and the phases of the moon will at least serve as an aid to the memory.

The spices of the country, such as capsi-cum and ginger, for which nature has given the inhabitants of the torrid zone an appetite, have also been found powerful in fortifying the body against the influence of noxious air. Either these, or the Peruvian bark, or similar substances, of a bitter and aromatic nature, given in wine, or if there should be none, in spirits, to men going upon unwholesome duty, have been found to have a powerful effect in preventing them from catching the fevers of the climate. This may not always be practicable in the hurry of a great fleet upon actual service; but has been found to be of great benefit in the common course of service.

But besides the poisonous effluvia of woods and marshes, the sensible qualities of the air are also to be attended to. If I were required to fix on the circumstances most pernicious to Europeans, particularly those newly arrived in the West Indies, I would  
say

say that they are, too much bodily exercise in the sun, and sleeping in the open air ; and the practices most hurtful next to these are, intemperance in drinking, and bad hours. The sickness and mortality among new comers may, in general, be imputed to some one of these causes.

The last direction I shall mention with regard to the preservation of health in a harbour is, that the ship should be made to ride with a spring on the cable, that the side may be turned to the wind, whereby a free ventilation will be produced, and the foul air from the head, which is the most offensive part, will not be carried all over the decks, as it must be when the ship rides head to wind.

But besides the obvious and sensible qualities of the air above mentioned, there are certain obscure properties which we do not understand, and which we find difficult to investigate ; for there are diseases prevailing in certain places which seem to depend on some latent state of the air. Of this kind is the complaint of the liver, so common in the East Indies, yet almost entirely unknown



in the West Indies; and in the West Indies there are certain diseases which prevail in one island and not in another; such as the *elephantiasis* \* of Barbadoes, which is an affection of the lymphatics peculiar to that island. In the climates of Europe there are also certain obscure conditions of the air that favour one epidemic more than another, and in some years more than others†. All this is very mysterious to us; and although we could detect these properties of the air, we probably could not prevent their bad effects, since man must every where breathe the air, whatever its qualities may be.

### S E C T. III.

Of FOUL AIR from the Neglect of Cleanliness in Men's Persons — INFECTION.

NATURE has wisely so contrived our senses and instincts, that the neglect of cleanliness renders a person loathsome and offensive to himself and others, thereby guarding against those fatal diseases that

\* Dr. Hendy has lately published an ingenious treatise upon this disease.

† See Sydenham's Works.

arise from bodily filth. The noxious air we speak of is generated by men keeping the same clothes too long in contact with the body, while they are at the same time confined and crowded in small and ill-ventilated apartments. Such is the origin of the jail fever, otherwise called the ship and hospital fever; and it seems to be with reason that Dr. Cullen ascribes the low, nervous fever of Britain to a similar origin, being caused, as he thinks, by an infection of a milder kind arising in the clothes and houses of the poor, who, from sloth or indigence, neglect to change their linen, and air their houses. From the general attention that has been paid to the lectures and writings of this eminent professor, this fever has pretty generally obtained the appellation of Typhus.

Man is evidently more subject to disease than any other species of the animal creation, owing partly to the natural feebleness of his frame, but still more perhaps to the artificial modes of life which his reason leads him to adopt. Habitations and clothing are absolutely necessary for his shelter and warmth, but the abuse of them is a fer-

tile source of disease, for some of the most fatal and pestilential diseases are produced and communicated by them, and we see that the greater number of fevers, particularly those of the low and malignant sort, may be traced to the want of personal cleanliness, and defective ventilation.

There are few subjects more abstruse and difficult of investigation than this of infection. The origin of specific contagions, such as the small pox and the venereal disease, seems to be almost beyond the reach of a conjecture; and why all the contagions we know, excepting that of the bite of a mad dog, should be confined to one species of animal, their effects not being communicable to any other, is equally unaccountable. Why is the body incapable of being affected more than once by certain morbid poisons; and whence comes the striking and curious differences of susceptibility to infection in different individuals at the same time, and of the same individual at different times?

Most species of contagion are produced by that very disease which it is itself the means  
of

of exciting\*. This is particularly the case with what are called the specific contagions. The infection, however, of which we are treating here, is not of this kind, for it may be generated without the previous existence of fever. Some have even doubted whether typhous fever is contagious, and the following fact seems, with others similar to it, at first sight to countenance these doubts. The fever with which so many members of

\* Whoever reflects deeply on this fact, will perceive that it is one of the most abstruse and unaccountable in the natural history of animal life, as well as one of the most distinguishing characteristics of animal nature. For why should a species of matter, produced by a certain morbid action, be itself the means of exciting that action in another person? It will be difficult to find any thing in the general analogy of nature to connect these two facts. In another view, it seems repugnant to the analogy of nature, and to the beneficent intentions displayed in the creation, that she should institute a law destructive of her own work, and subversive of the welfare and existence of living beings. It may, however, be inferred *a priori*, that this, like every other instance of physical evil in the universe, results from the operation of some general law, of which it is the necessary and remote effect; and there seems to be some similitude between this and the functions of digestion, secretion, and generation, the same general law of assimilation seeming to apply to them all. But our views upon this subject are too obscure to ground any satisfactory reasoning upon them.



the court were affected at the sessions of the Old Bailey in the year 1750, though it was derived from prisoners, could not with propriety be said to be communicated by them, for they themselves did not labour under it. Neither did it spread beyond those who were in the first instance affected by it ; for though it was so violent and fatal, none of the members of their families, nor any of those who attended them in their illness, caught the disease ; so that not being propagated it happily became immediately extinct.

It can only however be inferred from this, that the state of the air, and other circumstances necessary to render contagion active, were not then present. If men labouring under a similar fever are brought from a ship or elsewhere to an hospital, where they are stripped and washed, there will indeed be little risk of their infecting others ; yet there are so many instances of the attendants at naval hospitals catching this fever, though all adhering infection had been removed by virtue of the excellent regulations established there, that no doubt can remain of the fever being in itself infectious.

Doubts

Doubts have also arisen concerning the infectious nature of the yellow fever of the West Indies, the pestilential fever of 1792, in Philadelphia, and even of the plague \* it-

\* The ancients ascribed the prevalence of epidemic diseases in armies and cities to the anger of the gods, which may be a reason why there is no mention of infection among some of the early writers in physic. I have not been able to meet with any allusion to infection in the works of Hippocrates, Celsus, Aretæus, or Trallian. Thucydides, however, in his account of the plague at Athens, has an evident allusion to it. In the works of Galen there is clear evidence of his belief in the existence of it. He says, it is a fact so obvious, that no one can doubt of it; and it may be said, that the ancient authors who have not mentioned it conceived it to be so self evident, as not to require to be formally enunciated. But this is hardly credible in a matter so interesting to mankind, and as prevention is one of the most important branches of practical medicine, the consideration of it must be constantly recurring to those who treat of it. Whatever may be alledged with regard to others, this cannot be affirmed of Celsus, who has a chapter on the rules for avoiding the plague, where no mention is made of contagion, and he assigns certain winds as the cause of it. But what is still more astonishing, certain French writers, who have given an account of the plague of Marseilles in 1720, have attempted to prove, that it is not contagious; and Dr. Stoll of Vienna, as late as the year 1770, has professed the same opinion. *Nemo ægrotus quidquam somniat tam infandum, quod non aliquis dicat philosophus.*—VARRON. Fragment. This question is treated with great precision by Dr. Russel, in his Treatise on the Plague.

self,

self. These doubts seem to have taken their rise from its having been observed, not only that no contagion whatever\* infallibly affects all who are exposed to it, but that there are circumstances in which the most active and violent contagion has no effect. In order that any person should catch an infectious disorder, not only a certain predisposition of the constitution is necessary, but a concurrence of certain external circumstances, such as the manner of life, the state of the air in respect to heat, purity, humidity, † motion, and probably certain unknown conditions of it, that favour particular epidemics. When we reflect that there are so many requisites, each of which may be a *sine qua non* in giving effect to infectious matter, we can in some measure account for the ambiguity that has arisen with respect to the existence of infection in particular instances: and as a proof that the most violent infection loses

\* This is deducible from familiar facts with regard to the small-pox, and other contagious diseases; and in the plague which prevailed, in 1720, at Marseilles, a city containing 90,000 inhabitants, between 70 and 80,000 were taken ill, of whom 40,000 died, so that from 10 to 20,000 were not affected.

† See the effect of stagnation of the air, page 25, in the note,

its

its effect, even in its most accumulated state, we have only to advert to a well known fact in the history of the plagues which for so many ages afflicted England, that this disease did not prevail as an epidemic except from the end of June till the beginning of November, and was at its height in September. If the effect depended on contagion simply, it is manifest, that it could not have spontaneously disappeared while it was so immensely multiplied and so generally diffused. In the South of Europe, and in the Levant, the plague prevails in the spring months, which correspond in the degree of heat with the season that has been mentioned in England. \* Dr. Russel relates, that the infectious matter of the plague will adhere to particular apartments for several years successively, but will not exert its influence on the inhabitant except at the return of the usual season for its appearance.

The infection of fever differs from the specific morbid poisons : first, in its not depending in all instances on the disease itself, the common source of it being the stagnated

\* Treatise on the Plague, page 244.



*effluvia* of the human body, from the want of a change of linen, while there is at the same time an exclusion of fresh air. These are the circumstances which concur to produce febrile infection in jails, ill-regulated hospitals, and ill-disciplined ships. 2dly, This infection may exist about the persons of men without producing the disease. This happens to those about whose persons it was generated. 3dly, It may be caught more than once in life.

In order, therefore, to preserve the crews of ships from such diseases, means should be taken not only to prevent the introduction of infection already existing, but to prevent the generation of it on board.

#### 1. Means of preventing the introduction of Infection.

WAR is a state of violence and confusion, in which the hurry and emergency of service may be such as to render it impossible to put in practice all the rules which might be laid down concerning the preservation of health, yet it is necessary that those who direct the navy, either in a civil or military capacity,

capacity, should be aware of the causes of sickness and mortality, in order to guard against them as far as is practicable. From an indolent acquiescence in this belief of the hardships and inconveniencies of war being unavoidable, I have known neglect to arise in the conduct of officers with regard to those under their command, as if it was not the duty of a commander to employ his utmost attention to alleviate the misfortunes and mitigate the sufferings of his fellow-creatures; and we have seen that much more of the calamities of war arise from disease than from the sword. The like excuse might be framed for the neglect of stores and arms, which the hurry of service might equally expose to injury. We see, indeed, infinite pains taken to prevent cordage from rotting, and arms from rusting; but however precious these may be as the necessary implements of war, it will not be disputed that human hands are still more so; yet, though there is the additional inducement of humanity to watch over the health of men, I do not think that this, in general, is studied with a degree of attention equal to what is bestowed on some inanimate objects.

Ships

Ships of war are exposed to infection chiefly by receiving such men as have been raised by pressing, who are frequently confined in guardships, under such circumstances of bad air and bodily filth as tend to generate the most virulent infection. The service also requires sometimes that men be received from jails, and they are either criminals delivered over by the civil jurisdiction of the country, or captives who have been restored by the enemy after a course of confinement in their prisons. It may happen too, as we have seen \*, that men who are made prisoners of war at sea, may have infection about them, and will communicate it the more readily that they are strangers.

Infection, like some other poisons, does not so readily affect those who are accustomed to it, and therefore those who are in the habit of being exposed to it, frequently escape its bad effects, especially if it is gradually applied, as must be the case with those about whose persons it is generated. For the like reason, physicians and nurses are less susceptible than others; and strangers, who are accustomed to a pure air, are the most

\* See Part I. Book II. Chap. VI.

susceptible

susceptible of any. It is observed by \* Dr. Short, that contagious epidemics are more frequent and fatal in the country than in London, and this may probably be accounted for on the same principle; for every person in a great town is exposed to the breath and effluvia of others, and to a variety of putrid exhalations, which are unavoidable where multitudes inhabit together; but they are so used to them, that they are not affected by them; whereas in the country, where people are less accustomed to each other's company, and less used to impure air in general, they are the more readily affected when infection is introduced among them. It may even admit of a doubt if any society of men, living together, are entirely free from morbid contagion. It certainly sometimes happens, that a ship, with a long-established crew, shall be very healthy; yet, if strangers are introduced among them, who are also healthy, sickness will be mutually produced. This principle in the human constitution, by which the presence of strangers affects it, is well illustrated by a fact †,

\* See Comparative History of the Increase and Decrease of Mankind.—Quarto, London, 1767, p. 52.

† See Martin's History of the Western Islands, and Medical Communications, Vol. I. page 68.



founded on the best testimony, that, in one of the small western islands of Scotland, which is so remote, that the inhabitants are frequently without any communication with strangers for several months together; they become so susceptible, in consequence of this long interruption of intercourse, that they are seized with a catarrh when strangers of any description come among them. It was said before, that cleanliness was founded on a natural aversion to what is unseemly and offensive in the persons of others; and there seems also to be implanted in human nature, for the same purpose, an instinctive horror at strangers, as is visible in young children and uncultivated people. In the early ages of Rome, one word signified both a stranger and an enemy.

These observations naturally suggest several useful and practical remarks. It would appear that the utmost attention is necessary not only to guard against the actual presence of disease, but to be jealous of all new draughts of men, especially if they should come from guardships, jails, tenders, or the prisons of the enemy, and have been turned over from ships where  
disease

disease is known to have prevailed; nay, that it is best to avoid mixtures of any kind.

The infection of fevers seems different from most others in this, that it is very various in its degrees of virulence. There is reason to think that the poison of the small pox, and that of the venereal disease, are in their own nature invariable, and that the difference of these diseases, in point of malignancy, depends on the constitution and other circumstances of those affected; whereas that of fevers being of different degrees of activity, and being frequently obscure and latent, is, on that account, the more treacherous, and ought to be watched with the greater circumspection.

The mode of manning the navy by pressing, I take it for granted, is unavoidable; at any rate, it would not become me to arraign a practice which has had the public sanction for ages. It is, however, one of the principal means both of generating and spreading the seeds of disease, in consequence of the indiscriminate seizure of men for the public service, and the confinement that is necessary to secure them. And as the exigences

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of

of the service make it necessary to admit persons of every description, there is no other remedy for this evil but to annihilate, if possible, the contagion that may thus be conveyed into ships of war. This is done by stripping and washing the new recruits who may be suspected of importing infection; also by cutting off their hair, clothing them with new clothes, and destroying, or baking and fumigating, the old, before they are allowed to mix with the ship's company in which they are to enter.

Those who have put these methods strictly in practice, have been sensible of their great utility; and the most exact attention is necessary, as a single infected man, or even any part of his clothing, may spread sickness through a whole ship's company. When we reflect what havock an infectious fever sometimes makes in a ship, it will appear how very important this sort of attention is; and when the cause of the sickness of particular ships is traced to its source, it will generally be found to have originated from taking on board infected men at Spithead, or wherever else the ship's company may have been completed.

After

After the first edition of this part of the work was printed, an excellent institution was established at Portsmouth for the prevention of infection. A ship was appointed for the reception of the recruits of the fleet, to which they were carried, to be stripped, washed, and provided with new apparel, before they joined their respective ships \*. This had a visible good effect on the health of the fleet; and it was planned and executed by Sir Charles Middleton, Comptroller of the Navy, whose unwearied assiduity, as well as integrity and ability in that important post, claim the highest praise and gratitude from his country.

It follows farther, from the preceding observations, that there is a degree of risque in mixing two different sorts of men, even when there is no actual disease or suspicion of infection; for, whether it is from dormant infection, or merely from the circum-

\* There used formerly to be great sickness and mortality among the convicts in the hulks at Woolwich, but for the last five years, in consequence of a regular system of precaution being established, by stripping, washing, and new clothing the felons newly arrived from jails, the infectious fever has hardly been known, and there has been no instance of it the last two years.—(September, 1798.)



stance of change of air, such mixtures are known from experience to be sometimes productive of sickness. The late Admiral Boscawen was so sensible of this, that he avoided it, unless when some evident utility or necessity of service made it proper ; and upon this principle he used to resist the solicitations of captains when they requested to carry men from one ship to another upon changing their command.

One probable reason, among others, for ships of the line being more sickly than frigates or smaller ships is, that in greater numbers there is a greater chance of men of various descriptions and modes of life being mixed together.

## 2. Means of preventing the Production of Infection.

THE infection of fever is not always imported from without, but may be originally and spontaneously generated on board. The causes of this, as mentioned before, are want of personal cleanliness, and also confinement and crowding in close apartments.

Among brute animals, as well as the human species, acute infectious distempers are generated by their being confined together  
in

in numbers, in ill ventilated places. A complaint of this kind is common in dog-kennels, and also among sheep, where they are housed during the winter, or when too much crowded on board of ships. The glanders in horses is little known but in large stables, where the air is not freely admitted. Birds in aviaries are also subject to a peculiar disease.

In order to promote cleanliness, care should be taken that every man, on his first entering into the service, be provided with a proper change of linen, and that a frequent muster and review be made, in order to inspect their persons, and to examine their stock of apparel. A true seaman is in general cleanly, but the greater part of men in a ship of war require a degree of compulsion to make them so; and such is the depravity of many, that it is common enough for them to dispose of their clothes for money to purchase spirituous liquors. A muster and review, therefore, wherein men should be obliged once in the week to present themselves clean before their officers, and to produce a certain necessary quantity of clean apparel, would conduce both to sobriety and cleanliness. The exertion of

authority, and the infliction of merited punishment, is so far from being considered by the men as a hardship, that they expect it; and it is the duty of an officer, as it is of a parent to a child, to constrain those entrusted to his care to conform to what is for their good. It is common also for men to lay up their clothes in a wet and unwashed state, which in time is productive of the most offensive and unwholesome vapours; and this can be prevented only by their chests and bags being frequently inspected by their superiors.

It must be evident to any one who reflects on this subject, that a regulation of this kind is as necessary as any other part of duty; and it deserves to be made an article in the public instructions, instead of being left to the discretion of officers. This sort of discipline is particularly necessary in ships of the line, in which one cause of the greater unhealthiness is the difficulty of taking cognizance of so great a number; for, unless some regular method, as by muster, is established, there will be men who will escape notice, and skulk below, indulging in laziness and filth.

The good sense and humanity of many captains in the late war, led them to adopt methodical regulations of this kind for the preservation of cleanliness and order. The only public sanction given to this sort of discipline, was that of Lord Howe, who gave it in orders to those under his command, that each ship's company should be divided into as many divisions as there were lieutenants, and that these should be divided into squads, with a midshipman appointed to each; and that the officers should be respectively responsible for the good order and discipline of the men assigned to them.

It is an excellent custom, and pretty general in the navy, to allow the men one day in the week for washing, when the weather and other circumstances will admit of it. It would be a farther improvement in the rules of the service, to supply soap in the same manner as tobacco and fops are supplied, that is, to let the men have what quantity they want from the purser, who is allowed to charge it against their wages \*.

The

\* In the year 1796, I suggested to that excellent and celebrated officer Lord St. Vincent's, while he commanded the fleet in the Mediterranean, an application



The circumstances which generally conspire with want of cleanliness in producing morbid effluvia, are crowding, and want of ventilation. There is reason, however, to believe, that the first alone will have that effect, for there is the peculiar fœtor belonging to infection about the persons of common beggars, and others, who do not change their linen for a great length of time, though living in the open air as much as other people. Closeness and crowding, however, generally concur with it on board of ships. A certain length of time is necessary, in order that these should have this effect, and the longer they take place, the more certainly will infection be produced, and it will be the more virulent \*.

In

on his part to the board of Admiralty for a supply of soap to the crews of the ships under his command, either gratuitous, or by a stoppage in their wages. As his zeal is equal to his knowledge in all branches of naval duty, and as this proposal concurred with his own judgment, he made the application with success, and there has been a general order ever since for soap being supplied on the latter footing.

\* At the time I am writing this, (March 8th, 1785) there has occurred a fact which proves the effect of time in generating infection. There now prevails a contagious fever in several of the hospitals in London, and,  
among

In order to admit air freely, the ports should be kept open whenever the weather will permit this to be done. The great objection to free ventilation is the danger of exposing

among others, in that to which I am physician. In another hospital it has been so violent, that there has been a vulgar report that the plague had broke out in it. The same fever also prevails among the poor at their own houses. The cause of it seems to be, that the cold weather has been uncommonly long and severe; for the frost began early in December, and the cold has hitherto been more like that of winter than spring. The thermometer all this month has varied from  $30^{\circ}$  to  $35^{\circ}$ . Cold is favourable to infection, by preventing ventilation; for people exclude the air in order to keep themselves warm, and the poor in particular do so on account of their bad clothing, and their not being able to afford fuel to make good fires. The mortality in the Hotel Dieu of Paris was greatly increased in the cold winter of 1740, viz. from 1 in  $4\frac{1}{2}$  to 1 in  $3\frac{1}{2}$ . The fever among lying-in women in that hospital does not shew itself with great fatality except in winter, and in that season much more than one half of the women usually die. (See the work of M. Tenon, formerly quoted.) It appears by the bills of mortality of London, that the general mortality was much increased in 1740, and also in 1741, in which the winter was likewise uncommonly severe. This, however, seemed chiefly owing to the effect of cold upon pulmonic and aged people. Since the first edition of this work, there has been another proof of the effect of close apartments and cold in creating infection, in a paper by Sir George Baker, in the third volume of the

exposing men to the air in cold climates. But it fortunately happens, that fire, while it is the most effectual means of counteracting the cold air, is also the best means of promoting

the Transactions of the college of Physicians. It has already been stated how conducive heat is to prevent and extinguish infection by producing a change of air; and with this view, a chimney is of great use, even though no fire should be kept in it, as it serves for a ventilator. But if an aperture were to be made in an apartment merely with a view to ventilation, it should be placed in that part of the wall next the ceiling; for foul air naturally tends upwards, and the external air entering at the top of a room, would not be so apt to subject those within to the effect of cold, as it would not blow directly upon them. I was for some time at a loss to account for the degree of health enjoyed by the poor in London who live below ground, and for the air being sweeter there than in the habitations of the same class of people in garrets. This will easily be understood, when it is considered that in the former the communication with the open air is upwards. The same circumstance accounts for the superior sweetness of the air in a ship, to that of an apartment in a house of the same dimensions, for there is a perpetual exit for the foul air by the hatchways. And it is for this reason that more sick may be accommodated in an hospital ship without producing foul air, than could be safe or proper in the same cubic space in the apartments of a house. It is upon the same principle that the air-trunks proceeding from the ceiling of a room, or from the deck over head in a ship, prove such powerful means of ventilation. These trunks are preferable to openings made immediately into the open air, even though they should

promoting ventilation ; for wherever there is fire, there is a constant change of air taking place by means of the draught to which it gives occasion. This cannot be done with safety and convenience in all parts of the ship ; but frequent fires in the lower parts of a ship will prove extremely salutary, by drying up the moisture, and producing a change of air, and also in a cold climate by the warmth it produces.

should be close to the ceiling or deck, for the wind opposes the issue of the foul air, whereas the draught is perpetually upwards in the trunk. The air below ascends from its being warmer, and from this species of foul air being specifically lighter than common air. For the same reason apartments with high ceilings are favourable to the retention and production of contagion, unless there are apertures in the upper part of them, where the bad air would otherwise fettle and stagnate. This precaution is particularly necessary in great manufactures. There would be this farther advantage in jails from apertures near the ceiling, that they would not be so liable to be forced for the purpose of escape as if they were nearer the floor ; and in hospitals they would be out of reach of those who, wishing to indulge in warmth at the expence of pure air, might be induced to shut the windows. But an external communication with the air any where is of the utmost importance ; and it is observable, in Mr. Howard's account of prisons, that the jail distemper was most frequently to be met with where there was no chimney.

The



The hammocks and bedding should also be aired by exposing them upon deck, especially after the ports have been long shut in consequence of bad weather. They cannot be thoroughly aired unless they are unlash'd; and as this could not be conveniently done daily in men of war, it might be done from time to time by the different divisions in rotation \*. When the men come to sleep upon them after these operations, they experience the same agreeable sensations as from a change of linen; and this must conduce to health as well as pleasure, like all other natural and moderate gratifications. It may be farther remarked in favour of cleanliness, that it is not only directly conducive to health, but is naturally connected with habits of good order, sobriety, and other virtues. The most cleanly men are always the most decent and honest, and the most slovenly and dirty are the most vicious and irregular.

A ship of war must have a much greater number of men on board than what are ne-

\* It is of some consequence to attend to the materials of the seamen's beds; for, instead of flock, they are frequently stuffed with chopped rags, which, consisting of old clothes, emit a disagreeable smell, and may even contain infection.

cessary to navigate her ; for, besides the marines, a great many hands are necessary to man the great guns in time of action. For this reason, there is a greater risque of the inconveniences of overcrowding than in ships intended for commerce, and therefore much greater attention is necessary with regard to ventilation and cleanliness. There is a piece of management which tends also in some measure to obviate the necessity of crowding : This is to berth the watches alternately, by which it is meant, that one half of each watch should lie on different sides, whereby they do not sleep so close, and are not so much exposed to each other's breath, and to the heat and effluvia of each other's bodies. This has the farther advantage of preserving the trim of the ship.

What has been said of the ship and men in general, applies still more strongly to the sick, and the berth \* assigned to them ; for there is nothing so apt to increase, and even to generate, contagion, as a number of sick together, unless uncommon attention is paid to cleanliness and ventilation. This is

\* By a berth is understood the interval between two guns, or any space between decks, which is sometimes formed into a sort of apartment by means of a partition made of canvass.

so true, that, unless where the complaint is very catching, it is best not to separate the sick; for if there is a good set of men on board, those who are confined by sickness will be better nursed and tended by their messmates than in a sick berth. But if the state of infection renders separation necessary, the best part for the accommodation of the sick, in a ship of the line, is under the forecabin in a warm climate, and on the fore part of the main deck in a cold one. When they are under the forecabin, however, they ought to occupy only one side, as they would otherwise be disturbed by the men who must pass to and from the head, and the men in health would, in this case, be exposed also to contagion. As infection is most likely to arise among the sick, attention to cleanliness and air is doubly requisite where they lie. It is by many thought salutary, as well as agreeable, to diffuse the steams of vinegar among the sick; but it seems best to avoid all fumigations unless infection actually exists, or there are strong suspicions of it, for these practices may be deemed of such efficacy as to supersede the vigilance and attention necessary to maintain cleanliness, dryness, and ventilation, which  
ought

ought to be the objects of unremitting study.

Thus we see that cleanliness and discipline are the indispensable and fundamental means of health, without which every other advantage and precaution is thrown away. Government never bestowed more attention and expence upon the victualling of the navy than during the late war; but it would be to little purpose to provide the most nourishing and antiscorbutic diet, the most wholesome and cordial wines, the most efficacious remedies, and the most skilful physicians and surgeons, if the men are not constrained to keep their persons sweet, their clothing and bedding clean, and their berths airy and dry. It is, therefore, upon officers more than any others that the health of the fleet depends; and I should be excused in the frequent mention I make of this, were it known how often I have been the witness of the fatal effects of the neglect of these rules.

### 3. Means of eradicating Infection.

WHEN, from a neglect of the means above mentioned, an infectious fever comes actually



actually to prevail, and the infection, perhaps, adheres obstinately to the ship in spite of cleanliness, good air, good diet, and all the other means, which, if employed in due time, would have prevented it, then some measures are to be taken for eradicating this subtle poison.

The first step towards this is, to prevent the disease from spreading, and this is done by separating the sick from the healthy, and cutting off all intercourse as much as possible. For this end, it is necessary to appropriate a particular berth to contagious complaints, and not only to prevent the idle visits of men in health, but to discover and separate the persons affected with such complaints as soon as possible, both to prevent them from being caught by others, and because recent complaints are most manageable and curable. Officers might be very useful in making an early discovery of complaints, by observing those who droop and look ill in the course of duty; for seamen think it unmanly to complain, and have an aversion to be put on the sick list. I have heard of a method practised in some ships, of keeping a book  
on

on the quarter deck for the officer to mark the names of such men as might look ill, or might be missed from duty upon calling the roll, in order to afford the surgeon a means of finding out those who should be the objects of his care.

Those whose profession it is to superintend the health of the ship, would find it for their ease and interest, and should consider it as their duty, to walk over the different decks once a day, or every other day, in order to make an early discovery of those who may be taken ill \*. Though I have laid  
as

\* Since the last edition of this work, new instructions for navy surgeons have been drawn up and issued, upon that branch of service being transferred in 1796, from the Navy Board to the Commissioners of Sick and Wounded Seamen, who may now be properly called The Medical Board of the Navy. The following is one of the articles, "As it is of the utmost importance that proper means of cure should be employed at as early a stage as possible, of the several diseases to which the men are subject, and as seamen are naturally careless of their own welfare and averse to complain, you will, as often as you perceive any of the ship's company, who by their appearance give indications of illness, examine them, and put them on the sick list if necessary, that no time may be lost in stopping the progress of disease. And upon long cruises and voyages, when there is not a sufficiency of lemon-juice for the whole number of men on  
R board,

as great stress on the duty of the commander, as the proper guardian of health, yet his assiduity will not avail unless the surgeon also does his part, by such acts of attention as I have mentioned, joined to skill in his profession.

In order to prevent sickness from spreading, it is not sufficient to cut off all personal intercourse. The clothes of men are as dangerous a vehicle of infection as their persons; and it should be a strict and invariable rule in case of death from fever, flux, or small pox, to throw overboard with the body every article of clothing and bedding belonging to it.

Upon the same principle, in case of recovery from any contagious disease, as it would be too great a waste to destroy the

board, you will also, with the captain's leave, take a view of the ship's company from time to time, and examine whether any of them have obscure symptoms of scurvy, too slight to make it necessary for them to withdraw from duty and be put on the sick list; and you will also enquire what men have been longest on salt provisions; and making a list of such men you will present it to the captain, in order that he may give directions for such men being supplied with the usual allowance of lemon-juice and sugar, put in the purser's custody for that purpose."

clothes and beds, they should be smoked, and then scrubbed or washed before the men join their messes and return to duty. This precaution is the more necessary, as infection in a ship is extremely apt to be communicated by bedding, from the custom of stowing the hammocks in the netting, by which they are brought in contact with each other. This, however, is an excellent custom, as it not only clears the ship below, and serves to form a barricade on the gunwale, but tends to air the bedding; and this salutary effect should not be prevented, except in case of rain, by the coverings, called hammock-cloths, by the use of which utility is evidently sacrificed to an excess of neatness.

It sometimes happens that the number of sick in a ship is so great, that it is not possible to take proper and effectual measures on board for stopping the progress of disease\*.

But

\* Since the last edition of this work was published, a mode of fumigating has been brought into use on the suggestion of † Dr. Carmichael Smith, the peculiar ad-

† See a work entitled a Description of the Jail Distemper, as it appeared among the Spanish prisoners at Winchester, &c.—London, 1795.



But when she can be cleared of the sick by sending them to an hospital, no pains should be spared to extirpate the remaining seeds of infection.

For this purpose, let their clothing and bedding be sent along with them; let their hammocks, utensils, and whatever else they leave behind, be smoked, and either scrubbed or washed before they are used by other men, or mixed with the ship's stores; let the decks, sides, and beams of their berths, be well washed, scraped, smoked, and dried

vantage of which over charcoal and sulphur is, that it can be put in practice in the midst of the sick. It consists in pouring strong vitriolic acid on powdered nitre, whereby the latter is decomposed and the acid rises in the form of fumes. The trials that have been already made have been so much in favour of its efficacy, as to have procured it a place in the late instructions to Navy Surgeons. As it consists of the fumes of a mineral acid, it is presumable *a priori*, that it possesses some share at least of the same virtue with the volatile vitriolic acid in the sulphureous fumigation. It is also much in its favour, that it takes off the offensive smell of musty clothes; and several of the surgeons of the navy testify, that when the air has been contaminated by the effluvia of fetid ulcers, the nitrous fumigation has a wonderful effect in removing this.

by

by fire; then let them be fumigated with \*  
brimstone and charcoal, and, finally, white-  
washed all over with quick lime.

Should

\* It is remarkable that this method of purifying was practised in the most ancient times, as we learn from the following passage in Homer, where Ulysses is represented fumigating the apartments of his palace in which the suitors had been slain :

Τὴν δ' ἀπαμειβόμενος προσεφη Πολυμητις Ὀδυσσεύς  
Πῦρ νῦν μοι πρῶτισον ἐνὶ μεγάροισι γενέσθω,  
Ὡς ἔφαθ'. ἔδ' ἀπίθησε φίλη τροφὸς Ἑυρύκλεια  
Ἦνεγκεν δ' ἄρα πῦρ καὶ θήϊον αὐτὰρ Ὀδυσσεύς  
Ἴεν διεθείωσεν μέγαρον καὶ δῶμα καὶ αὐλήν.

OMHP. OΔΥΣ. X.

Bring sulphur straight, and fire, the Monarch cries;  
She heard, and at the word obedient flies.  
With fire and sulphur, cure of noxious fumes,  
He purg'd the walls and blood-polluted rooms.

POPE.

This practice was probably founded in superstition, rather than the knowledge of nature. That some divine influence should be ascribed to fire was very natural, as the principal deities of the ancients were only personifications of the elements; and it is worthy of remark, that their name for sulphur signifies *something divine*, το θεῖον, which was probably owing to its being found in those volcanic chasms of the earth, in Sicily, Italy, and the Lipari islands, which were supposed to communicate with the infernal regions; for the whole Greek mythology relating to these was taken from the phænomena attending the subterraneous fires in those parts. It is

Should any officer object to the trouble and inconvenience of all this, let him reflect for a moment how much more troublesome and inconvenient, as well as noisome and disagreeable, sickness itself proves to be; let him reflect that the efficiency of the ship, considered as a bulwark of defence, or an engine of annoyance, depends on the number of healthy hands, and that his own character is to depend on the exertions to be

curious farther to remark, in other instances, how facts useful to mankind, the truth of which has been confirmed in later times by the more enlightened knowledge of nature, were first suggested by some superstitious circumstance. Thus the wound received by Telephus could not be cured, according to the Poet, till, by divine intimation, he was desired to apply to it the rust of the spear with which it had been inflicted, in consequence of which it healed. But the weapons in those days were made of brass, so that the rust of the spear must have been the *ærugo æris*, which has been found by the experience of modern surgery to be one of the best detergents in ill-conditioned sores. It is probably, from a false analogy, founded on some such incident, that an idea prevails among the vulgar, which has become proverbial, that some part taken from the offending body is good in all external injuries. Thus some part of a mad dog is said to have a virtue in curing his bite. In this false application may be seen, how far that knowledge which is suggested by superstition falls short of what is acquired by the observation of nature.

made

made by them in the day of battle, not to mention the attention due from him as a man to the sufferings of the objects themselves.

But besides these recent infections, it sometimes happens that the seeds of disease adhere to the timbers of a ship for months and years together, and can be eradicated only by a thorough cleansing and fumigation. Sweeping, washing, scraping, and airing, are not sufficient entirely to remove the subtile infectious matter; but they will assist and will prepare it to be acted upon by heat and the fumes of mineral acids, which are the only means to be depended upon.

When a ship is at sea, these precautions cannot be taken so completely; but if infection is present, or is suspected, then cleansing and the nitrous fumigation may be practised.

It will also be of great service to make the men expose their clothes to the sun and wind, in order to prevent or carry off mustiness or slight infection. If a strong infection is suspected, and it cannot be afforded

R 4

to



to destroy the clothes, the best means of eradicating the poison at sea is to hang them for a length of time over pots of burning brimstone in a large cask standing endways, with small apertures to admit air enough for the brimstone to burn, or the nitrous fumigation may be used for this purpose.

Fire, where it can be applied sufficiently strong, is perhaps to be considered as the principal agent of \* purification, by its heat and the ventilation it occasions. Next to this may be reckoned the fumes of brimstone, and those of the nitrous acid. The smoke of certain narcotic and resinous bodies has also been recommended, such as tobacco and tar. The vapour of vinegar and the smoke of gunpowder have also been used, but have been known to fail †. It militates also against these, that the attention bestowed on more trifling means may divert the mind from a proper regard to what is more essential. It is mentioned by the benevolent Mr. Howard, that it is the custom in some parts abroad to scatter fresh branches of pine or spruce in

\* It is remarkable that the Latin words *purus* and *pargo* are derived from *πυρ*, fire.

† See Dr. Brocklesby's Medical and Œconomical Observations,

the hospitals, in order to purify the air ; but, trusting to this, they neglect the admission of fresh air, which is the only effectual method of sweetening apartments, and of warding off infection.

There is reason to think that the open air very soon dissipates and renders inert all infections of the volatile kind, and of course the warmer the air is the more readily it will have this effect. It is accordingly observed, that infection is much less apt to be generated about the persons of men, and that it adheres to them for a much less space of time in a hot climate than in a cold or temperate one. This is a remark, which, so far as I know, has not been made by any author ; and, till observation suggested it to me, I fancied the reverse to be the truth. I have seen so many instances of filth and crowding in ships and hospitals in the West Indies, without contagion being produced, and which in Europe could hardly have failed to produce it, or to render it more malignant, that I am convinced there is something in tropical climates unfavourable to the production and continuance of infectious fevers.

vers \*. The ships which bring this fever from Europe, in general get rid of it soon after arriving in a warm climate; and nothing but the highest degree of neglect can continue or revive it.

The facts above mentioned brought into my mind what is related of the plague at Smyrna and other places, that it disappears at the hottest part of the year. The climate being hotter at Cairo than Aleppo, the plague ceases a month sooner at the former than the latter. It is also curious and important to remark, that the true pestilence never has been heard of between the tropics. It is not easy to assign the cause of this effect of heat upon infection, as every thing relating to this subject is very obscure. We can conceive it to be owing to the greater degree of airiness which the heat of the climate makes necessary, or to the use

\* A fact related in Anson's Voyage, is also strongly in proof of the same opinion. When the rich ship from Acapulco was taken, it was necessary to crowd the prisoners into the hold, for fear of an insurrection, which was to be dreaded from their numbers; yet, when they arrived in China, none of them had died, nor had any disease broke out. They suffered only in their looks, being wan and emaciated to a great degree.

of

of fewer woollen clothes. There may be something in the state of the body, particularly in the pores of the skin and lungs, which disposes them less to produce or absorb the poisonous effluvia, or, when absorbed, it may more readily be thrown out by perspiration with the other acrimony of the blood; or more probably, as has been hinted above, the virulent matter is of such a degree of volatility as to be readily dissipated in a certain degree of heat\*.

There is a fact, which, though seemingly of a contrary tendency, yet is in reality in proof of the same opinion. It is, that these same diseases disappear in circumstances of great cold. The plagues which have visited England have disappeared in winter; and the same is observed at Moscow and other places. In this case the infectious matter is rendered *inert*, but not *extinct*, and the return of heat sets it afloat in the atmosphere,

\* It may be brought as a farther proof of a warm climate being unfavourable to every sort of infection, that though the itch is very common in ships and hospitals in Europe, I do not remember ever to have met with it in the West Indies, except in ships newly arrived from England.



so as to expose it to human respiration.

\* Dr. Guthrie informs us, that infection is entangled and fixed by the cold of winter on the doors and walls of the houses of the Russian peasants, and that upon the return of the warm season it is set loose by the thaw, and then becoming active, produces diseases.

With regard to the West Indies, the precautions that have been laid down are chiefly necessary when a ship newly arrives in the climate; for it is during the first three or four months that sickness is most apt to prevail,

This does not depend upon any thing peculiar to the climate; for I have known ships arrive without being visited with any sickness. It seems to be owing, for the most part, to that stock of infection and disease imported from Europe exerting its effects, and when this has spent itself, the men remain in good health, unless exposed to the land air or other accidents; for the air at sea in those climates, as well as every

\* Philosophical Transactions.—Vol. 69.

where

where else, is extremely pure and wholesome, and there is no where that seamen are more healthy or comfortable.

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## S E C T. IV.

OF the FOUL and DAMP AIR generated in a Ship.

I MEAN here to distinguish the unwholesome vapour produced by the contents of the ship from the infection produced by the effluvia of men's persons, which was treated of in the last section.

The means of preventing this unwholesome air from being generated are, cleanliness, dryness, and ventilation.

All parts of a ship may, if neglected, become dirty, and emit an offensive vapour; but the parts under water, consisting of the orlop and hold, are more particularly so from the materials they contain, and from the want of free access to the fresh air; accordingly, there is always more or less  
stench

stench in those parts, even in the best-regulated ships.

It was mentioned in the \* first part of this work, that an opinion was entertained by some, that no foul air was productive of fevers but such as proceeds from the living human body. I alledged that this was otherwise, at least in hot climates; and some proofs of this opinion were adduced, particularly from the French prizes. Though the neglect of personal cleanliness is the principal source of disease, yet cleanliness of every kind, and purity of the air in every respect, is to be anxiously studied.

With regard to general cleanliness, it is hardly necessary to mention sweeping, washing, and scrubbing of the decks; for the natural propensity of the English † nation  
to

\* Page 88, and 107.

† This circumstance, in the character of the English, is only of modern date; for we learn from Erasmus, who was in England about two hundred and fifty years ago, that they were then extremely slovenly. The following passage is extracted from a letter he wrote to a physician in York, after his return to Holland:—"Conclavia  
" solâ fere strata sunt argillâ, tum scirpis palustribus, qui  
" subinde sic renovantur ut fundamentum maneat aliquo-  
" ties

to neatness seldom allows any neglect of these. Lord Howe, to whose virtues as a man, and abilities as an officer, his country is

“ties annos viginti sub se fovens sputa, vomitus, mic-  
“tum canum et hominum, projectam cerevisiam et pis-  
“cium reliquias, aliasque sordes non nominandas.” He adds, that the windows were very ill calculated for ventilation, and imputes to the closeness and filthiness of the houses, the frequent and long continued plagues with which England was infested, and particularly the sweating sickness, which, he says, seemed peculiar to this country. He mentions that his own country had been freed from the pestilence by certain changes that the State had made in the houses, in consequence of the advice of some learned man. *Erasm. Lib. xxii. Epistol. 13.*—It is probable that the greater number of those epidemics, called plagues, were only bad infectious fevers. What would contribute still more to the production of infection was the want of linen, which was not in use in those days except among a few in the upper ranks of life. The disappearance, or at least the great diminution of such complaints in modern times, particularly in London, has been ascribed to the great increase in the proportion of vegetable food; but it is certainly more owing to the improvement in personal cleanliness, and to the greater spaciousness and neatness of houses. As a farther proof of this, it may be mentioned that in the charity, called Christ’s Hospital, in London, founded by Henry the Eighth, for the maintenance and education of poor boys, their sustenance is all animal food, as it was at the original institution, yet they are extremely healthy. The same observation applies to Winchester school, which was founded some ages before that.

The



236 CAUSES AND PREVENTION [PART II.  
 is so much indebted, gave it in general or-  
 ders to wash the upper decks every day in  
 fine

The circumstances in diet which seem to give the common inhabitants of London the advantage over their ancestors and their cotemporaries in the country, are a more plentiful and nourishing food, and the use of good malt liquor. I have been settled in practice in London for the last fifteen years, during which time I had opportunities of knowing the state of health of both ends of the town, having been twelve years physician to one of the largest hospitals in the city; and though I have heard of low fevers prevailing at times in some of the alleys where the air is much confined, there has been nothing deserving the name of an epidemic, besides those diseases proceeding from specific contagions to which children are chiefly subject, and an epidemic catarrh which appeared in the beginning of 1795, whereas we have heard of fevers and fluxes prevailing in different parts of the country, the cause of which could generally be traced to low living and bad air in work-houses or elsewhere.

There are some passages in ancient history in confirmation of the advantages of personal cleanliness. Herodotus relates, that the ancient Egyptians were the most healthy of all the nations, except the Libyans, and he imputes this to the invariableness of their weather, and the serenity of their sky. But he mentions in another part of his works, that they were also the most cleanly of all people, not only in their household utensils, but in their persons, and that their clothing was chiefly of linen, which it was one of the principal studies of their life to wash and keep clean—*ἐμματα δὲ λινέα φορεῖσι αἰεὶ νεόπλυτα ἐπιτηδεύοντες τὸ το μάλιστα.* Herodot. Euterp. 37.—It is remarkable that he makes

fine weather, the lower decks twice a week, and the orlop once a week at least. He also ordered that every washing, smoking, mustering, and review of clothes, or any other means taken for the health of the ship, should be marked in the logbook, and the reason to be assigned there if omitted at the stated times. These rules are a good specimen of the order that ought to prevail in every branch of public duty; for it is well known to every experienced officer, that it is a methodical proceeding of this kind which can alone render service either easy or effective.

The loss of men's lives from the foul air of the well is a common accident in ships, and I have been myself witness to several instances of it. Where there is the least suspicion of this, a candle should previously be let down, and if it should be extinguished, it may be concluded that the air is

no mention of the plague, though he gives a very minute account of the country from his own observation, from whence it may be naturally inferred, that it did not then exist there, though Egypt is now so subject to it, that it is supposed by many to be an endemial disease in that country.

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deadly.

deadly. As this species of foul air is heavier than common air it requires some trouble to remove it.—The most expeditious method is to let down fire in a pot or grate, which soon changes the air, by producing a draught of it upwards.

It is a very salutary practice to let down fires frequently into the well, both in order to purify the air and to dry the surrounding parts. It was formerly mentioned that this was daily done in the \* Intrepid, and the effect of it was to remove the wetness of the ballast and the mouldiness which had overspread the sides and beams; and having had the effect of sweetening and purifying the air, it seemed to be the principal circumstance that tended to make this ship extremely healthy from being the most sickly of all the fleet. This precaution, as well as every other point of cleanliness, is more necessary in large ships, because the mass of foul air, as well as the quantity of corrupting materials, is greater †.

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\* See Page 58.

† It is proper also to observe here, that those ships which are built of winter-felled timber are much drier than those built of what is summer-felled; and this circumstance should have been mentioned with regard to

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the

The following fact strongly evinces the good effect of fire and smoke:—When it was the custom for frigates to have their kitchens between decks, they were much more healthy than in the present construction, in which they have them under the fore-castle, where the heat and smoke are dissipated without being diffused through the ship, and causing a draught of air upwards, as formerly. The men derived then also great benefit and comfort from having a large fire, round which they might assemble to warm and dry themselves in a sheltered place. I leave it to those who preside in the construction of the navy to determine how far it would be advisable to return to the old manner of construction. The French ships of the line have their kitchens and ovens between decks, and this must tend to counteract the effects of their want of cleanliness. The Dutch ships of the line have their kitchens on the orlop

the Montague; for the cause of her healthiness, notwithstanding her being a new ship, was probably from being built of winter-felled timber. It should therefore be strictly enjoined to fell the wood in winter; for those who are employed to do it have an interest in doing it in summer, on account of the value of the bark.



deck, which must be still more conducive to the general purity of the air.

Moisture is pernicious both in itself and as the instrument of putrefaction. All the complaints, called colds, are more owing to wet than cold; and moisture may be the means of producing, or at least of exciting dangerous fevers, when they would not otherwise appear.

It has been made a question by some how far simple moisture is pernicious. Although there are many propositions that have obtained the general assent of mankind, and pass for matters of fact and experience, without being founded upon principles of real observation and induction, yet the most enlightened observers will, I think, agree with the vulgar in this, that moisture, whether on the clothes, in apartments, or in the air, is pernicious to health, and tends to produce fevers and feverish complaints. Dampness or wet seems to be more adverse to health at land than at sea, in a warm climate than in a cold or temperate one. It is remarked, that the crews of ships cruising in constant fogs on the banks of Newfound-

land often enjoy good health. Nor is mere moisture at land always injurious to health. Ireland is not only extremely rainy, but the soil is very wet from the large bogs with which that kingdom abounds, yet this country has not been considered as remarkably unhealthful either to its inhabitants or to strangers. These bogs, however, are composed of a matter which is not volatile nor subject to putrefaction, so that the vapours resemble those at sea. It is not so with the fenny parts of England, and other countries which are extremely subject to intermittent fevers and other complaints. It appears farther, that moist air is not only pernicious in itself, and from the effluvia exhaling from the earth along with it, but that it is a vehicle of noxious exhalations with which it seems to have a greater chemical affinity than with dry air. This cannot be better illustrated than by an observation common in London, that there are many houses with which the communications with the common sewers is not accurately cut off, but the offensive smell is not perceived except when the air is damp. Approaching rain can be predicted by the ascent of this stench. With regard to hot climates, the

difference of a dry and moist air cannot be put in a stronger point of view than by the two following facts. The first is, that there is a periodical wind on the coast of Africa called the \* Harmattan, which, by its extreme dryness in consequence of blowing over hot sandy deserts, absorbs moisture with so much avidity as to destroy vegetation if it continues many days, parches the skin, eyes, and lips, and opens the seams of wooden furniture. It is however so salubrious, that fevers and fluxes soon recover while it blows, a stop is put to epidemics, and the infection even of the small-pox will not take effect. The second fact is, that the Dutch colony of Batavia, while it is the most unhealthful of all places, is also the most moist, in consequence of the great number of canals made there in order to make it resemble Holland.

We may therefore consider it as an ascertained truth of the utmost importance, that moisture, whether adhering to clothes, to the sides and decks of ships, or floating in the air, is pernicious to health, and that one

\* Phil. Transf. Vol. 71.

of the principal means of preserving health consists in obviating it. The great attention that has of late been paid to dryness by officers of the navy seems to be one of the principal causes of the superior health which at present prevails in our ships of war. One of the methods lately practised for producing dryness has been, to rub the decks with sand heated in the oven.

A wet hold diffuses moist vapour all over the ship; and it was a rule with some of those commanders whom I observed to be most successful in preserving the health of their men, not only to have daily fires in the well, but to bail out the water when the pumps could not exhaust it all, and never to allow it to collect to more than the depth of a few inches. It is, therefore, very doubtful whether it is a good practice to let in water, as is very commonly done in order to sweeten the hold, for the same sweetness will be preserved if it is kept strictly dry. If it should happen, indeed, that there should be a great deal of putrid matter in the lower parts of the ship, from previous neglect or unavoidable leakage, it may be adviseable to let in a quantity of water



in order to loosen and wash off what is offensive, and then to pump it out.

There is a circumstance in the first fitting out of a ship well worth attention, as highly conducive to the dryness and cleanness of the hold. I mean the choice of the ballast; for that which is called *shingle*, consisting all of pebbles, is far preferable to that which is sandy and earthy, and it does not so readily soak and retain the moisture and filth. Water or fluid of any kind readily subsides in it, and should any putrid matter be entangled in it, there will be less difficulty in washing it out.

The decks should not be washed so often when the weather is moist as when it is fine, as it will be more difficult to dry them, and more harm may arise from the moisture than benefit from the cleanness; and in climates and seasons where the weather is both wet and cold, it would be most advisable to omit washing altogether, and to depend upon scraping and sweeping. Washing should also be performed very early in the morning, even in the best weather, in order that there may be time for the decks to become

come dry in the course of the day. It is after a general washing that the moveable fires, formerly described, are most proper and useful.

Every contrivance should be fallen upon to change the air in the orlop and hold. Ventilators and windfalls \* are well adapted for this purpose, and should be used as frequently and for as long a time as possible. It has also a good effect in cooling the air in the lower parts of a ship in the West Indies, to lift the gratings of the hatches, raising them on their edges, and lashing them to the staunchions. It contributes likewise to cleanliness and coolness to keep the decks as clear as possible from † chests and other lumber, which are in the way of sweeping and washing, and prevent also the free course of the air.

\* A windfall or windflieve is a long cylinder of canvas, open at both ends, kept extended with hoops, and long enough to reach from the lowermost parts of the ship through all the hatchways into the open air.

† It is not necessary that seamen should have chests, for bags or wallets answer their purpose equally well, and are much more convenient in respect of stowage.

Particular

Particular attention to ventilation is necessary in frigates, for almost all that part in which the men sleep is excluded from the air, and they are therefore very uncomfortable in the West Indies unless small scuttles are cut in the sides. But if this should be objected to as weakening or endangering the ship, there is a good contrivance for the same purpose, which I met with on board of the *Nymph* frigate. It consists of a square wooden pipe, of about nine inches in the side coming from between decks, running along the side of the ship, and opening over the gunwale of the forecastle. There was one on each side.

A better contrivance than this has lately been adopted on board of some hospital and prison ships. It consists in an aperture made in the middle of the deck overhead, three feet long by one and a half wide, from whence a tube ascends tapering into the open air, about six feet above the upper deck; and to prevent strong currents of air from descending, a screen is made to traverse with the wind by means of a vane, so as to keep the opening to leeward of it.

SECT.

## S E C T. V.

Means of guarding against INFECTION and  
BAD AIR.

INFECTION never prevails to such a degree, as to affect every person indiscriminately who is exposed to it. Even where the plague and small-pox prevail to the greatest degree, there are some persons who, though susceptible of these diseases, yet escape them. There are certain other infections of a weaker nature, as was before observed, and these will remain entirely inactive, till they find a proper concurrence of external circumstances and constitutions so disposed as to be fit subjects of their action. The seeds of disease may be compared to those of vegetables, which lie dormant, unless they happen to fall into a situation peculiarly adapted for exciting their activity, and for which a number of requisites must concur, such as a given degree of temperature, moisture, soil, shelter, and rest, adapted to each particular species. It is very difficult to account for this uncertainty in the operation of infection, but it is extremely providential,



vidential, that under the most calamitous state of sickness, there are always some who are in health and who survive, for the necessary purposes of life. If this were not the case, it might happen that every person on board of a ship might perish from sickness in the course of a voyage, a circumstance which I believe has never been known to happen.

There is an endless variety in the constitution of the human frame, both in mind and body, as well as in the features of the face. There are, perhaps, no two individuals in the world in whom the same effect precisely is produced by the same food, air, medicine, poison, or passions of the mind. The different effects of infection, therefore, upon different people, seem to depend, in many cases, on peculiarities of constitution as well as external circumstances too obscure to be explained; but there are also known circumstances which resist or encourage its effects.

The great power of habit\* in taking off  
the

\* Since the first edition of this work was published, I have met with a fact in confirmation of this principle,  
with

the effect of infection, has already been mentioned, and it would appear that novelty gives an increased energy and activity to all impressions, as well as those on the senses. If a person, therefore, escapes the first attack of infection, he will be more likely to continue exposed to it with safety in future.

There are certain precautions necessary to be attended to by those who are unavoidably exposed to contagion, particularly in the first instance. Those who can afford a full diet, and a liberal use of wine, have been observed to resist infection better than those who use food and drink that is meagre and watery. It is also a good rule not to go among the sick, nor otherwise to expose one's self to infectious air, with an empty stomach; for whether it is that the body is then more susceptible, or that the pores of the skin and lungs are in a more highly absorbing state, so as with greater readiness to inhale the poison of disease, it is certain that

with regard to the cutaneous complaint called the *ring-worm*. This had prevailed in a private school in the neighbourhood of London, which I visited, but it had to all appearance become extinct; yet it nevertheless affected those boys who were newly sent to the school.

a person

a person in that situation is more apt to catch harm from foul air of any kind.

The most usual method of catching fatal infections is by the breath, and the greater number of contagious diseases affect either the lungs themselves or some of the avenues of respiration, in the form of peripneumonic complaints, catarrhs, and sore throats. This is observable with regard to the small-pox, measles, whooping cough, epidemic catarrhs, the scarlet fever, the \* plague of Athens, to which may be added the thrush † and the mumps. The same remark holds with regard to the epidemics of animals, such as the glanders in horses, and the contagious distemper among dogs. The principal cause of safety from ‡ inoculation seems to

\* Thucydides, B. II.

† It appears by the journal of some of the surgeons of ships of war, that the mumps and the thrush will sometimes prevail among a crew like an epidemic, but not so as to prove fatal.

‡ Another probable reason for the safety of inoculation may be, that when the poison is imbibed spontaneously from the air, it is only in those moments when the system is most predisposed for its reception, whereas inoculation obtrudes it, as it were, at those times in which

to consist in avoiding this mode of introducing the poison, whereby the vital parts are less affected. As respiration is a function which does not admit of interruption, the inhaling of vitiated air must be extremely difficult to avoid, but the common practices of breathing through a handkerchief or with plugs in the nose, with a view to filter or purify the air, seems to be founded in reason.

Whatever weakens and exhausts the body, renders it also more susceptible of noxious impressions. Under the head of weakening powers, I comprehend not only what empties the body of its fluids, such as loss of blood, or a diarrhœa, but intoxication, fatigue, fasting, watching, and certain affections of the mind, such as care, grief, and fear, which produce a languid circulation and weaken the powers of life. Predispositions are thus established by previous habits in consequence of a long series of impressions from heat, cold, food, exercise, and passions,

which the constitution is least disposed to yield to its impression. (See this principle farther illustrated in a Lecture on Muscular Motion, read before the Royal Society, Nov. 1788, by G. BLANE, M. D.)

which



which are again modified by the diversity of original stamina, producing an endless variety of constitutions susceptible of disease in different degrees and forms. It is owing to this modification from previous impressions, that the diseases prevailing at any particular time are not imputable merely to the actual state of the weather but to what has preceded. Thus the inflammatory diseases of March are owing to the previous cold of winter, and the choleras of August to the heats of July. As a farther illustration of predisposition being formed by external habits, it may be remarked that particular \* classes of society, and particular † nations are

\* It sometimes happens that the rich are subject to epidemics from which the poor are exempt, but the reverse is more frequently the case. In the last plague of London, the people of condition who fled from town found upon their return that very few of their friends and acquaintances had died, the mortality being almost entirely confined to women and children, and the poorest and lowest sort of people. (See Continuation of the Life of Lord Clarendon by himself.) These facts are additional proofs of the principle so much insisted on in this work, of the necessity of a concurrence of circumstances in order to give effect to infection.

† A very fatal epidemic prevailed among the Indians in 1763, in Nantucket and Rhode Island, which affected none of the English inhabitants, though intermixed with them. There are several facts of the same kind recorded both by ancient and modern physicians.

exempt

exempt from the influence of infection. Besides these causes predisposing to the action of infection, there are others which immediately excite it. The chief of these is cold. This is of itself simply productive of catarrhs, rheumatisms, and the like disorders; but if an infection should be accidentally present when the body is exposed to it, then instead of these complaints, the disease peculiar to that infection will be produced\*. This was illustrated in the last reinforcement we had from England; for while bad fevers were breaking out in most of the other ships, the † Union was affected with those complaints only which are simply the effects of cold. It would be more proper, perhaps, to say, *exposure to the air*, than to call it *cold*; for exposing the naked body to the open air, even in the warmest climate, is prejudicial to health. This holds at least with regard to Europeans who are accustomed to clothing, however the natives of hot climates

\* It is mentioned by Thucydides, that while the plague raged at Athens, the people were affected with no other disease; from which it would appear that those persons who would otherwise have been attacked with some particular indisposition, were seized with the plague in place of it. Vide note, p. 247.

† Part I. Book II. Chap. VI.

who are accustomed to go naked, may expose themselves with impunity.

It is of the greatest consequence to ascertain the extent of the influence of infection, for the means of avoiding and preventing it will very much depend upon this. It is now known, that infection extends itself to a very small distance. There are, indeed, some morbid poisons, such as that of the bite of a mad dog, and that of the venereal disease, which require actual contact to make them take effect. Others are more volatile, and seem to be inhaled by the breath, or absorbed by the skin, but these do not extend far; that of the plague \* does not reach above a few yards, and that of the small-pox and of fevers is probably equally limited. This discovery is very va-

\* It is related by the travellers into Turkey, that the Christians save themselves from it, merely by shutting themselves up in their houses, and the inhabitants, who sleep on the open roofs of the houses, do not catch it even from those of the adjacent buildings, though the wall that separates them is of no great height; and though they are supplied with provisions by the windows, handed to them by the infected, who sometimes drop down in the act, yet they do not catch it, though the smallest rag from the infected would communicate it.

luable

luable, by ascertaining the limits of danger ; for when a person imagines he runs the same risk when at a considerable distance from the seat of disease, as if he were in contact with the person affected, he will be apt to expose himself wantonly and unnecessarily to the infection.

It seems to be owing to the ignorance of the extent of its influence, that the plague has in general been so fatal ; for in consequence of the opinion that the whole surrounding atmosphere was affected, it was vainly attempted to purify it by large fires in the open air, or by \* firing off artillery, instead of trusting to the separation of the sick so as to avoid their near approach, and to the confinement of those in health to their own houses, which are all the precautions necessary to prevent its progress, and which were neglected on the supposition that the contagious matter was widely diffused through the atmosphere.

\* Vide Opera Ambrosii Parei.



## CHAP. II.

## OF ALIMENT.

## SECT. I. OF SOLID FOOD.

THE most unnatural circumstance in a sea life is the food which men use, and the disease most peculiar to it is one which is owing chiefly to the nature of the aliment; for though other causes conspire in aggravating the scurvy, the depraved state of the *INGESTA* is the usual and principal cause of it.

It is this disease that is most fatal to seamen next to fevers. It was formerly as fatal, if not more so; but some modern improvements have rendered it less frequent and violent. The habitual use of salt provisions, besides producing evident symptoms of scurvy, begets such a state of the constitution, that, upon the least scratch being received, particularly on the lower extremities, a large and incurable ulcer ensues; and this circumstance, trifling as it appears, is  
the

the cause of losing an incredible number of men to the service, especially in the West Indies. The greater part of the food of a ship's company is necessarily salted meat. Biscuit and pease, though of a vegetable nature, are hard of digestion ; and though they qualify the animal food, they do not answer the purpose of fresh vegetables. Though officers have a supply of live stock even for the longest voyages, it would be impracticable to carry a quantity sufficient to preserve a whole crew from the scurvy. But certain articles have of late been introduced into use, of a durable and portable nature, which so qualify the salt provisions, that they can be used without inducing this disease. These consist either of articles of common diet, such as melasses and four kroust, or those which are intended only for the sick and recovering, such as portable soup and the preserved juice of lemons and limes.

It is one of the most ancient and real grievances in the service, that there has not been a sufficiently ample supply of nourishment and cordials for the weak and recover-

ing. This complaint is made by \* Dr. Cockburn, who was physician to the fleet in the end of the last century ; and it is a complaint that has not yet been entirely redressed, nor has the subject been considered with the attention it deserves. The only improvement in the sea victualling that I know of from that time till of late, has been the use of raisins for puddings, and the occasional use of vinegar, which is an article extremely salutary, and was looked upon as the great preservative of health in the Roman armies.

After the force of disease has been subdued at sea, men are frequently lost by relapses, or pine away in dropsies and other chronic complaints, for want of being supported by some cordial and nourishing diet. It is mentioned in my memorial to the Admiralty, how insufficient the small quantity of surgeon's necessaries are ; and it is recommended that a large quantity of certain species of refreshment should be put in the purser's charge, which, being substituted for the common sea victualling while men are ill or recovering, would cost Government

\* See Essay on Sea Diseases.

little or nothing. Besides the articles already mentioned, it was recommended to set apart a quantity of the best wines, and to be provided with brown sugar, dried fruits, barley, rice, fago, and salep. Carrots and other roots might also be preserved for the longest voyages by means of sugar; and green vegetables might in like manner be preserved by means of salt. But of all the articles, either of medicine or diet, for the cure of the scurvy, lemons and oranges \* are of much the greatest efficacy. They are real specifics in that disease, if any thing deserves that name. Upon what principle their superior efficacy depends, and in what manner they produce their effect, I am at a loss to determine, never having been able to satisfy my mind with any theory concerning the nature and cure of this disease, nor hardly indeed of any other. The great utility of these vegetable juices cannot be sufficiently impressed on the minds of those who direct the Navy.

\* Limes, shaddocks, oranges, and perhaps all the other fruits of the natural order called hesperidæi possess the same virtues. Whenever I mention lemons or lemon-juice, it is to be considered as a short expression for the whole of this order.



Every person who has beheld with attention and feeling the tedious and languishing series of suffering which the sick and recovering endure for want of the means of supporting and recruiting their strength and spirits, must wish that those who preside in the civil department of the navy would seriously consider this subject, and complete the reform that has already been begun \*.

With

\* With a view to promote this the following article was proposed in the new instructions drawn up for the guidance of Navy Surgeons in the year 1796. "When men are admitted into your list, instead of their allowance of salt beef, pork, biscuit, small beer, or rum, you are to demand of the purser through the captain, in lieu of the above articles, such quantity of the following as you may judge proper for the situation of your patients, viz. barley, rice, oatmeal, melasses, raisins, flour for soft bread, portable soup and wine. These, with the articles under your own charge, will prove a comfortable diet for the sick and convalescent." This was adopted with the other articles by the Admiralty, but was suspended for reasons which it is needless here to detail. This, or some other mode of victualling the sick is greatly wanted, for were it not for the general humanity of officers in supplying refreshments to the sick from their own table, they would labour under the utmost distress. This practice is highly honourable

With regard to the victualling of men in health, a most commendable attention has been paid to the improvement of it. The ordinary articles of victualling have not only been of excellent quality, but some new articles have been added, from which the greatest benefit has been derived. The chief of these are four krount and melasses. The latter was first brought into use by Captain Ferguson in the beginning of the late war. He ordered it to be served with rice to the men who were affected, or threatened with the scurvy, in the ship under his command. The benefit experienced from it in this and other instances was so great, that during the last two years of the war it was made a regular article of sea victualling,

honourable to the character of our sea officers; but any thing dependent on the casual bounty of individuals is too precarious a provision in such an important point of service.

The present assortment of necessaries allowed for a hundred men for three months is as follows: six yards of linen, four yards of Welsh flannel, three pounds and a half of tea, two pounds of chocolate, four pounds of sago, eight pounds of rice, sixteen pounds of barley, twenty-four pounds and a half of soft sugar, two ounces of ginger, two saucepans.

and

and substituted in place of a certain proportion of oatmeal \*.

As

\* In the course of the passage from England to the West Indies in February, 1782, the following directions for using the four kroust and melasses were given in public orders by the Admiral to the different ships of the squadron:

“ The allowance of four kroust made by the public  
 “ boards in England, is two pounds to each man every  
 “ week; and the Admiral orders that from a pound and  
 “ a half to two pounds (beginning with the lesser quan-  
 “ tity, and increasing as the men may find it palatable)  
 “ be boiled with every gallon of pease on a pease day.  
 “ The cooks are desired not to wash it, nor to put it  
 “ into the coppers till the pease are sufficiently broken.  
 “ Half a pound is directed to be issued raw to each man  
 “ on beef days, and a quarter of a pound on pork days.  
 “ It is recommended that the allowance of vinegar be  
 “ saved particularly on meat days. When four kroust  
 “ runs short, the pease and beef days to have the prefer-  
 “ ence; when shorter still, the pease days. Melasses  
 “ having been allowed in lieu of part of the oatmeal, in  
 “ the proportion of eleven pounds to two gallons, the  
 “ Admiral directs, that a pound of melasses be boiled  
 “ with every gallon of oatmeal on Mondays, Wednes-  
 “ days, and Fridays, mixing it and stirring it round  
 “ with the burgoo immediately after it is drawn off.  
 “ He directs that half a pound of melasses be issued  
 “ with every three pounds of flour, over and above the  
 “ common proportion of raisins; and to prevent any  
 “ abuse, it is directed that the purser’s steward pour it  
 “ into the platter with the flour of which the pudding is  
 “ made.

As bread is one of the principal articles of diet, the utmost care should be taken in preserving it, and great advantage would arise from stowing it in casks that are water tight, instead of keeping it in bags, or letting it lie loose in the bread room. Captain Cook, by this method, and by giving it a cast in the oven in the course of the voyage, preserved his biscuit sound in every respect for more than three years. But the greatest improvement in this article of diet would be to have, in the form of flour, a greater proportion of what is now allowed in bread. The flour might be made into puddings, and seems, in this form, to be more nutritious and antiscorbutic than biscuit which has undergone a strong force of fire. This sort of mess would be still more proper and agreeable now that melasses is a stated article of diet. Flour, by being well pressed and rammed, will keep as long as biscuit,

“made. The Admiral forbids the use of pease in lieu of  
“oatmeal, as has sometimes been the practice.”

These rules were suggested by Sir Charles Douglas, captain of the fleet, whose benevolence is equal to his known professional skill; and he had ascertained the utility of the preceding directions when captain of the Duke in the former part of the war.

and



and it can be stowed in one fifth part of the space; it will, therefore, cost much less in freight than the same quantity of it in that form, and it may be baked abroad if necessary \*.

Of all the former articles of sea victualing, there was none more abused than oatmeal. The quantity allowed to each man was twice as much as he could consume, and the overplus went to the purser's profits, or was wasted by being given to the hogs, or even wantonly thrown overboard. Mellasses have, with great advantage, been substituted for part of it, in the proportion of

\* In the French ships of war there is an oven large enough to supply not only all the officers and sick, but part of the crew, with soft bread every day. The advantages attending the use of flour in place of bread are so great and obvious, that the former will probably, in time, be substituted entirely for the latter. We have already seen (p. 138) the practicability and good effects of baking under all the inconveniencies of the old fire-places. The objection chiefly made to it at that time was the greater consumption of wood occasioned by baking; but this is now obviated by the general adoption of the fire-places of cast iron, invented by Mr. Brodie, in which the ovens are heated by the same fire with which the victuals are boiled.

eleven

eleven pounds for two gallons of oatmeal. The first trial of melasses was in the \* Foudroyant, and it answered so well, that, in a cruise under Admiral Geary in 1780, this was the only ship free from the scurvy, and out of two thousand four hundred men that were landed at the hospital with this disease, there were none from this ship. It appears to be so similar in its nature and effects to essence of malt, that it seems hardly worth while for Government to be at the expence of providing the latter †.

A certain proportion of barley has also of late been substituted for part of the oatmeal, which being more light and palatable, makes a pleasing variety, particularly to the sick and recovering. Captain Cook carried wheat with him, and found it to answer equally

\* Mr. Nepean, afterwards Under Secretary of State, and now (1798) Secretary to the Admiralty, was at that time purser of the Foudroyant, and acted a very benevolent and disinterested part, by being instrumental in introducing this reform in the navy victualling.

† It is now (1798) discontinued by orders from the Admiralty, lemon-juice having been found adequate to the prevention and cure of scurvy, and the expence attending it is little more than what the essence of malt cost to the public.

well.

well. It would not be right, however, to abolish oatmeal entirely; for it is a good article of diet, and serves for gruel and poultices. There is also a certain preparation of it which is an antiscorbutic of equal, and perhaps superior, efficacy to any whatever, except the juice of lemons and oranges. This is flummery, or sowins, which is prepared by letting oatmeal and water stand together till they grow acidulous, and then boiling them into a jelly. I know of some well-attested instances of the crews of ships being saved from the scurvy by this alone.

Butter is a good article of victualling, in so far as it renders that part of the diet which consists of grain and vegetables more palatable, and thereby induces men to eat more. But as it is extremely corruptible in a warm climate, hardly any being used by the seamen but what is more or less rancid, it should never be sent to a tropical station. Greater quantities of it are condemned than of any other article of victualling, and it is therefore the most expensive to Government. There are certain articles that are the natural produce of the West-India islands, which may be substituted for it with the greatest advantage. These are sugar and

cocoa \*, which, during the last year of the war, were served in place of butter with great success, and this proved an alteration in diet not only salutary, but agreeable to the seamen, whose inclinations are always to be consulted in such changes †.

This

\* Half a pound of cocoa, and as much sugar, was allowed in place of a pound of butter.

† TABLE, exhibiting the daily Allowance of Provisions for each Man in the Navy.

	Biscuit.	Beer.	Beef.	Pork.	Pease.	Oatmeal.	Butter.	Cheese.
	lbs.	galls	lbs.	lbs.	Pint.	Pint.	ozs.	ozs.
Sunday - -	1	1		1	half			
Monday - -	1	1				1	2	4
Tuesday - -	1	1	2					
Wednesday -	1	1			half	1	2	4
Thursday -	1	1		1	half			
Friday - -	1	1			half	1	2	4
Saturday - -	1	1	2					

This has continued from the last century till the alterations above mentioned, all of which, except the introduction of vinegar, currants, and raisins, have been made in the three last years of the war which ended in 1783. When the stock of small beer is exhausted, half a pint of spirits is allowed daily, diluted with four or five times



When a ship is in port, encouragement should be given to the sale of roots, greens, fruits, and sugar. The men have a good custom of exchanging part of their bread, beef, and pork, for what they can get from the shore; but as they in general prefer spirituous liquors to the above-mentioned articles, the greatest care and vigilance should be used to preclude men from such opportunities of injuring themselves. Every ship should be furnished with a seine, and other implements for fishing, when in harbour.

When captures are made, in which there are such articles as sugar, wine, rice, or fruits, it would be much better in many cases to allow the immediate use of them at sea, where the men may be disposed to scurvy or other diseases, than to wait for the conversion of them into money.

Though it has been my object to introduce as many articles of diet as possible, in-

times its quantity of water. When wine is supplied, the daily allowance of it to a man is one pint. Other exchanges are usual on foreign voyages, such as three pounds of flour and half a pound of raisins, or half a pound of currants, or half a pound of beef suet pickled, in lieu of a four pound piece of beef, or a two pound piece of pork, with pease. Half a pound of rice is allowed for a pint of oatmeal.

dependent

dependent of salt provisions, it does not follow that these are in themselves unwholesome. They are pernicious by being made almost the sole and exclusive article; but if used in moderate quantity, they are even in some respects well adapted for the food of seamen. The nature of their life gives them a strong digestion: in their duties they not only employ violent exercise, but use more muscles and a greater variety of postures and motions than men of any other profession. To such constitutions may not food of a refractory nature and hard of digestion, have even an advantage over what is more delicate and digestible?

It does not appear that it is the salt quality alone of the provisions used at sea that makes them productive of scurvy, but also the want of their native juices and of the nutritious principle. A small quantity of salt is necessary to make all food palatable and wholesome, in so much that it is reckoned one of the necessities of life. All animals have a craving for sea salt, and nature has kindly made it the most abundant and universal of all saline bodies. Food, without this seasoning, not only comes to be  
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leathed, but the want of it renders the animal weak and flabby. As it not only assists digestion, but invigorates all the bodily functions by stimulating and bracing the fibres, it is in some cases a valuable medicine. It is remarkable that men are very apt to tire of a long continuance of fresh provisions\*, but never of what is salt; and even under the scurvy the latter will be relished, and sometimes preferred to most other kinds of food. It has been a practice with some to make the scorbutic men drink sea water; but though it is not attended with any manifest benefit, I never heard that it aggravated the disease.

I was told by the gentlemen of the army at New York in 1780, that the soldiers in cantonments were not near so subject to agues as the people of the country; and the only difference in their mode of life was, that the former had in their allowance a certain proportion of salt provisions.

\* The sailors in the squadron of Commodore Anson never murmured more under any of their hardships than when they were fed with fresh turtle for a length of time in the South Sea.

In

In an unhealthy country I should think the use of salt, as well as spice \*, would be

\* Since the first edition of this work was printed, I have met with a book published by Mr. Fletcher, a navy surgeon, in which he mentions that spices, being antiseptic bodies, might be substituted for part of the salt in curing provision, and this would, no doubt, be an improvement in the sea victualling. The quantity of spice he proposes for every barrel of beef or pork is four ounces of black pepper, and as much allspice, and also eight ounces of nitre in powder. It may be farther alledged as an advantage of spice over salt, that it would be less apt to run into brine, which robs the meat of the greater part of its nourishment.

Since the last edition of this work was published, I have made some trials of curing beef by half the usual quantity of salt, and in place of the other half I caused to be added to every hundred pounds one pound of pounded pimento, and as much powdered juniper berries, and an ounce and a half (liquid measure) of muriatic acid. The powdered spices were mixed with the salt and rubbed on the beef, and the acid mixed with the pickle used in the common method of curing beef. I sent part of it to the West Indies, and seventeen months after it was cured, and about fourteen months after being in that climate, it was opened by direction of rear-admiral Ford, who obligingly undertook to superintend the experiment, and the report made was that it was perfectly sweet and juicy, and so fresh that salt would have been necessary to give it a relish had it not been for the spices. I kept by me in London some that was cured at the same time and in the same manner, examining it at different times, and found that it was perfectly good at the end of five years.



salutary; and when ships are in port it would perhaps be better to allow a certain proportion of salt provisions, because it would not only be wholesome and agreeable, but the men's constitutions would probably be more reconciled to an entire salt diet when necessary: but I would except from this the crews of such ships as have newly arrived from a long cruise or voyage, in which it may be necessary to alter the constitution as quickly as possible by a diet entirely fresh.

Nothing that I have collected from my own observation, or that of others, has been neglected under this head, except one particular caution with regard to the preparation of the victuals. The large utensils employed to boil the provisions are made of copper, and it sometimes happens from neglect that these are allowed to contract a rust, which is one of the most active poisons we know. The neglect consists chiefly in allowing any thing acid, or what is liable to become acid, such as gruel or burgoo, to remain for a length of time without being washed out; for when victuals have been prepared in the boilers thus uncleared, they produce

produce the most violent effects, even to the loss of life, as once happened in a ship belonging to our fleet \*.

\* This accident happened in the Cyclops frigate in September, 1780. Mr. Gordon, the surgeon, favoured me with the following account of it:

“ Mr. Smith, an officer, John Barber and Anthony Wright, seamen, having eat some victuals prepared in a foul copper, complained soon after of violent gripes, giddiness, and vomiting, and they had a few loose stools. There was intense heat; the pulse was quick, full, and hard; a tremor of the hands and tongue, and wildness of the eyes. The looseness was soon succeeded by obstinate costiveness, tension of the abdomen, difficult breathing, and loss of deglutition. In the night, towards the morning, there came on insensibility, with an increase of all the symptoms except the heat. The body was violently convulsed, with cold clammy sweats and coldness of the extremities. The abdomen subsided a short time before they died, and, before they expired, a small quantity of greenish matter, mixed with phlegm, issued from the mouths of two of them.

“ Thirty-three other men were put on the sick list with similar symptoms in a less degree, and some of them continued on the list for five or six weeks before they perfectly recovered.”

It is not said what means were attempted for the recovery of these men; but, besides emetics and milk, or oil, a dilute solution of the fixed alkali in water has been recommended against this poison, as it would, on the principles of chemical affinity, decompose the verdigrease, which is a metallic salt.

## S E C T. II. O F D R I N K.

AS the solid part of sea diet is very dry and hard, and as the salt it contains is apt to excite thirst, a freer use of liquids than at land is necessary, particularly in a hot climate.

It has been the custom, as far back as we know, to allow seamen the use of some sort of fermented liquor. We need hardly inquire if this is salutary or not; for it would be impossible at any rate to withhold it, since it is an article of luxury, and a gratification which the men would claim as their right. There is a great propensity in seamen to intoxicating liquors, which is probably owing to the hardships they undergo, and to the vicissitudes and irregularities of a sea life. But there is reason to think that all sorts of fermented liquors, except undiluted spirits, are conducive to health at sea, when taken in moderation,

There is no doubt that malt liquor is extremely wholesome and antiscorbutic. The  
common

common quantity of small beer allowed daily is so liberal, that few men make use of their whole allowance; and there is no objection to the constant use of it, except that it is apt to spoil in the course of a few weeks, and that upon foreign stations the stock can seldom be renewed. One of the greatest improvements that could be made in the victualling of the navy would be the introduction of porter \*, which can be preserved in any climate for any length of time that may be necessary.

Spruce beer seems to possess similar and

\* I was furnished by Dr. Clephane, physician to the fleet at New York, with the following facts, as a strong proof of the excellence of this liquor :

In the beginning of the war two store ships, called the *Tortoise* and *Grampus*, sailed for America under the convoy of the *Dædalus* frigate. The *Grampus* happened to be supplied with a sufficient quantity of porter to serve the whole passage, which proved very long. The other two ships were furnished with the common allowance of spirits. The weather being unfavourable, the passage drew out to fourteen weeks, and, upon their arrival at New York, the *Dædalus* sent to the hospital a hundred and twelve men; the *Tortoise* sixty-two; the greater part of whom were in the last stage of the scurvy. The *Grampus* sent only thirteen, none of whom had the scurvy.



equal virtues with malt liquor ; and it has this advantage, that the materials of it can at all times be carried about and used occasionally. It agrees with malt liquor in being a fermented vegetable sweet, the principal ingredient of it being melasses. The other ingredient, from which it takes its name, being a balsamic substance and therefore diuretic, seems to be more medicinal and antiscorbutic than hops, and is therefore, perhaps, preferable to malt liquor. There have been sufficient proofs of its virtues in single ships ; and all the men of war that go to America and the West Indies might be conveniently supplied with it. Admiral Pigot provided a sufficient quantity for the whole fleet ; but the peace coming on prevented the trial of it.

The most salutary kind of drink next to malt liquor, and spruce beer, is wine. The benefit which the fleet derived from it at different times, and the advantage it has over spirits has been often taken notice of in the former part of this work. It seems to be owing to this that the French fleet sometimes enjoys superior health to ours,  
and

and is less subject to the scurvy \*. Wine is also preferable to every other medicine in that low fever with which ships are so much infested; and there is no cordial equal to good wine in recruiting men who are recovering.

Spirits differ from wine in this respect, that they are a mere chemical liquor, incapable of assimilation with our fluids, having lost in distillation the native vegetable principle in which the whole of its nutritious quality and great part of its medical virtue resides.

The abuse of spirituous liquors is extremely pernicious every where, both as an interruption to duty, and as it is injurious to health. It is particularly so in the West Indies, both because the rum is of a bad and unwholesome quality, and because this species of debauchery is more hurtful in a hot

\* We have a remarkable proof of this in comparing the fleet under the command of Admiral Byron with that under the Count d'Estaing, when they both arrived from Europe on the coast of America in the year 1778, some of the British ships having been unserviceable from the uncommon prevalence of scurvy, while the French were not affected with it.

than

than in a cold climate, and one of the most common causes of exciting the malignant fevers peculiar to tropical countries.

It is with reason that the new rum is accused of being more unwholesome than what is old; for, when long kept, it not only becomes weaker and more mellow by part of the spirit exhaling, but time is allowed for the evaporation of a certain nauseous empyreumatic principle which comes over in the distillation, and which is very offensive to the stomach. Therefore, though this is the produce of the West-India islands, yet what is supplied there is inferior to that which is brought from England. Another objection to the rum supplied in the West Indies is the admixture of lead, which it acquires from the vessels employed in distilling \*.

It was originally the custom to serve seamen with their allowance of spirits undiluted. The method now in use, of adding water to it, was first introduced by Admiral

\* See a paper on this subject in the 3d Vol. of the Medical Transactions, by J. HUNTER, M. D.

Vernon in the year 1740, and got the name of *grog*. This was a great improvement; for the quantity of half a pint, which is the daily legal allowance to each man, will intoxicate most people to a considerable degree, if taken at once in a pure state.

The superiority of wine over spirits in any shape was so conspicuous, that towards the end of the war the fleets in the West Indies and North America were supplied with nothing but wine, and with a success sufficient to encourage the continuance of the same practice in future.

### OF WATER.

As water is a necessary of life, and as the health and comfort of men at sea depend upon its quality, it deserves particular attention.

Spring water is to be preferred to running or stagnated water; for, unless it is taken at the source, or near it, it is apt to be impregnated with decayed vegetable and animal substances, such as leaves, grass, wood, and dead insects. This inconvenience is greatest in a hot climate, where every thing  
teems



teems with life, and where the materials of putrefaction are both more abundant and more prone to corruption. This is the most pernicious kind of impurity; for the mineral impregnations common in springs are seldom, in any degree, unwholesome, and do not tend, like the other, to make the water corrupt. At many of the West-India watering places the water is found stagnated just above high-water mark; and care should be taken to go higher up to take it where it is running.

The purest water is apt to spoil by producing a putrid glare upon the inner surface of the cask which contains it. There is a great difference in this respect between a new cask, especially if made of moist wood, and that cask which has been hardened and seasoned by age and use. Several contrivances have been proposed for preparing the vessels that hold the water; but none have been found by experience so effectual as letting them stand for some time full of sea water; and it is a great advantage of this method, that it is so easily practicable.

It is in few places we meet with water such as that of Bristol, which, in clean vessels,

sels, may be kept for any length of time. We may consider all water kept in wooden vessels as more or less liable to putrefaction; but there is a substance, which is neither rare nor costly, that effectually preserves it sweet. This is *quick lime*, with which every ship should be provided, in order to put a pint of it into each butt when it is filled. It is probably owing to the small impregnation of quick lime found in Bristol water that it is so incorruptible. It has the advantage of not being injurious to health; but, on the contrary, is rather friendly to the bowels, tending to prevent and check fluxes. In the year 1779 several ships of the line arrived in the West Indies from England, and they were all afflicted with the flux, except the Stirling Castle, which was the only ship in which quick lime was put into the water; nor does it spoil the water for any culinary purpose. Its action in preventing putrefaction consists, in part at least, in destroying vegetable and animal life. An addition of putrescent matter is produced in water by the generation of small insects; and the glare that collects on the sides of casks, and also what collects on the surface of the water, is a species of vegetation of the order called  
by

by naturalists *algæ* \*. Quick lime is a poison to this species of vegetable life as well as to insects: but upon whatever principle it depends, the property of it in preserving water sweet is so well ascertained, that it is inexcusable ever to neglect the use of it.

Quick lime is equally efficacious for this purpose, whether slacked or unslacked; and though the latter form is more convenient for stowage, by having less weight and bulk, yet the other is to be preferred for the sake of safety; for if water should by chance reach the unslacked lime, a great degree of heat is thereby produced, which has been known to give occasion to the most formidable accidents.

The only other objection I know of to the use of quick lime is, that it converts the water into a lime water, rendering it thereby disagreeable to the palate and stomach: but the quantity necessary to preserve it makes but a very weak lime water; for part of the lime is precipitated by the

\* See an article in Rozier's Journal de Medicine for July, 1784, by Dr. Ingenhoufsz.

mephitic air, or the aerial acid, as it is otherwise called, of which there is some contained in the water. The accidental exposure to the atmosphere, which also contains this sort of air, tends farther to lessen the acrimony of the quick lime.

There are other substances which have been found useful in correcting bad water. Alum and cream of tartar, as antiseptic bodies, have been employed for this purpose. Vinegar and the vegetable acid juices and fruits, such as tamarinds, may be used occasionally to take off the putrid offensive taste which may have arisen in case the use of quick lime has been neglected. In the fleet under Sir Charles Saunders, the water of the river St. Lawrence having been found to produce fluxes, this quality was removed by throwing four pounds of burnt biscuit into each cask before it was used. But there is nothing so effectual, and subject to so few inconveniences, as quick lime.

The next method to be mentioned of purifying water is filtration, which not only separates the gross impurities, but removes the putrid smell and taste. It is performed  
with



with a dripping stone, which is a convenient contrivance for officers, but cannot furnish a supply for a whole ship's company.

When the water of wells or brooks is found loaded with mud, the following expeditious method of filtration, described by Dr. Lind, has been practised with success:—Let a quantity of clean sand or gravel be put into a barrel placed on one end, without the head, so as to fill one half or more of it, and let another barrel, with both ends knocked out, of a much smaller size, (or let it be an open cylinder of any kind) be placed erect in the middle of it, and almost filled with sand or gravel. If the impure water be poured into the small barrel or cylinder, it will rise up through the sand of both barrels, and appear pure above the sand of the large one in the interval between it and the small one.

But when water is offensive in consequence of being long kept, the most effectual and expeditious method of sweetening it is by making air pass through it, or by exposing it to the air in as divided a state as possible. Boiling will not expel the putrid  
effluvia

effluvia contained in water; but such is the attraction of air for this offensive matter, that the water need only be thoroughly brought in contact with it to be rendered quite sweet. This is best done either by blowing through it, by inserting the nozzle of the bellows into a tube, or by a machine invented by Mr. Osbridge, a lieutenant of the navy. This consists of a hand pump, which is inserted in a scuttle made at the top of a cask, and by means of it the water, being raised a few feet, falls through several sheets of tin pierced like cullenders, and placed horizontally in a half cylinder of the same metal. The purpose of it is to reduce the water into numberless drops, which being exposed in this form to the open air, is deprived of its offensive quality. The same method will serve to separate the superfluous quick lime in the water. It is a machine very deservedly in common use, and the working of it is a moderate and salutary exercise to men in fair weather.

The following contrivance will be found to afford a sufficient supply of sweet water to particular messes, and may be considered as an artificial and more expeditious sort of

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dripping

dripping stone. — Let the narrow mouth of a large funnel be filled with a bit of sponge, over which let there be a layer of clean gravel or sand covered with a piece of flannel, and over the whole another layer of sand. Muddy or offensive water being poured upon this, runs or drops out clear; and care must be taken to change the sand, sponge, &c. frequently, as they will become loaded with the impurities of the water \*.

There should be in every ship an apparatus for distilling water in case of distress. This consists merely of a head and worm adapted to the common boiler, and distillation may go on while the victuals are boiling. More than eight gallons of excellent fresh water may be drawn off in an hour from the copper of the smallest ship of war †. I refer for a more particular account of

\* See Dr. Lind on the Health of Seamen.

† The want of this apparatus may be supplied, in case of exigency, by a contrivance mentioned by Dr. Lind, consisting of a tea-kettle with the handle taken off, and inverted upon the boiler, with a gun barrel adapted to the spout, passing through a barrel of water by way of refrigeratory, or kept constantly moist with a mop.

In this place I cannot help mentioning also, that in case of great extremity it has been found that the blood may

of all this to the works of Dr. Lind, who was the original inventor and recommender of this method.

This invention seems to have escaped others so long, from the idea that the *desideratum* in freshening sea water was some substance to be added to it while under distillation. No such substance is necessary, and the more simple the mode of distillation, the fresher the water will prove.

Rain water at sea is always pure and wholesome, and may be saved occasionally by means of a sail or awning.

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### S E C T. III.

#### O F C L O T H I N G .

NATURE has made man so defenceless, that even the rudest nations, in the hottest climates, in general, adopt some sort of co-

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may be diluted, and thirst removed, by wetting the surface of the body even with sea water, the vapour of which is always fresh, and is inhaled by those pores of the skin whose natural function it is to imbibe moisture, of which there is always more or less in the common air of the atmosphere.



vering to guard themselves from the weather. Man seems to be an exotic in temperate and cold climates, from its being necessary to his welfare and even existence to procure warmth by art. We may affirm, that clothing is the most artificial circumstance in the life of man : and there is none, of which the errors subject him to more inconvenience and hardship. Insensible perspiration is performed by the pores of the skin, and being one of the most important functions of the body, the suppression of it seems to be one of the principal causes, or at least one of the most frequent attendants on feverish and inflammatory complaints ; and one of the most common causes of this suppression is the application of cold to the skin.

In order to keep up perspiration, it is necessary that the orifices of the pores of the skin should be bathed, as it were, in the vapour already secreted from them ; and clothing seems to act in confining this, as well as in preventing the escape of the natural heat and the access of the external air. Though the air should not be cold, it will  
check

check perspiration by carrying off this vapour and drying the skin. In the warmest climates, exposure of the skin to the external air is unsafe to the native of cold and temperate climates; for it not only produces a feverish and uneasy sensation at the time, but occasions the most dangerous internal disorders. In consequence of the great sensibility and sympathy of the body, and from the pores of the skin being open in a warm climate, exposure is in some respects even more dangerous than in a cold one. Nothing is more apt to bring on the locked jaw and tetanus than sleeping in the open air; and it was observed in Jamaica, that when it was the custom to wear cotton and linen clothes, the dry belly-ache was much more common than now that it is the custom to wear woollen cloth. Some particular constitutions may even require the use of flannel next the skin even in a hot climate, but it tends so much to weaken the body by exciting an excess of perspiration, that it cannot be recommended as a general and indiscriminate practice.

We know besides, that the pores of the skin can absorb not only the moisture that

floats in the atmosphere, but a variety of foreign bodies, whether noxious or medicinal, which may be applied to their orifices; and as the air is in certain places loaded with noxious matter, may not clothing be considered as a filter, as it were, to separate the impurities of the air before it comes in contact with the surface of the body?

It is therefore every where of the utmost consequence that sufficient and suitable clothing should be provided.

It would certainly be for the benefit of the service, that an uniform should be established for the common men as well as for the officers. This would oblige them at all times to have in their possession a quantity of decent apparel, subject to the inspection of their superiors. It would also be less easy to dispose of their clothes for money without detection, and desertion would also thereby be rendered more difficult.

It is of great consequence that the purser should lay in a sufficient stock of clothing and bedding suited to the climate for which the ship is destined, in order that there may  
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be a sufficient supply after having been on a distant station for a certain length of time. I have known men suffer the greatest inconvenience and hardship, and infectious diseases kept up, from the neglect of this. Very great hardship and suffering, as well as sickness, arises also in the passage to England in winter, from men not being furnished with warm clothing, upon coming into the cold latitudes after having been on a tropical station. There is generally warm clothing in store at the principal ports in the West Indies, and a demand should be made of a suitable quantity of it for ships on the point of sailing to England.

The greatest evil connected with clothing, is the infection generated by wearing it too long without shifting, for the jail, hospital, or ship fever, seems to be more owing to this than to close air. The great importance of cleanliness appeared when we were treating of infection, from whence we may judge of what consequence it is that men should be provided with a shift of linen, as it is that part of the clothing that is in contact with the skin, which harbours infection \*.

\* When we consider that linen was not in use among the ancient Romans, we might be apt to wonder that



As clothing is not the gift of nature, being left to man's own reason, it is subject to caprice, and thereby productive of inconvenience and disease. The necessity of it depends very much upon habit, like every thing else relating to the human body, and therefore sudden and unseasonable changes of apparel are very unsafe to health. It is also found that a partial exposure of the body is more pernicious than a general exposure. If I were writing for the more delicate part of the world, I should illustrate this by the danger of exposing the feet alone to cold or wet. It is seldom that seamen are susceptible to so great a degree, for their hardy and exposed life steels them against such impressions. But there is another circumstance which renders it of the utmost consequence, to defend the feet against external injury. It frequently happens, that,

they were not more unhealthy; but their substitute for this was frequent bathing, which not only served to remove the *sordes* adhering to the surface of the body, but to air that part of the clothing which was usually in contact with the skin. The washing of the bodies of men suspected of infection upon their first entrance into a ship, has already been mentioned, and I have known some commanders who made their men frequently bathe themselves with great seeming advantage.

without

without any visible symptoms of scurvy, the constitutions of seamen are such, that, upon the least scratch being received on the feet or legs, a large spreading incurable ulcer arises, which sometimes ends in the loss of a limb; but at any rate disables them from duty till a cure can be effected by the use of a fresh and vegetable diet, or a change of climate. It is remarkable, however, that these ulcers seldom or never arise on the soles of the feet. Next to acute diseases and scurvy, this is the most destructive complaint incident to a sea life, particularly in a hot climate; and I have known great numbers of good men thereby lost to the service. It is, therefore, of the utmost consequence that men should not only be supplied with shoes, but be obliged to wear them, which is found to require a degree of compulsion; for in the West Indies it is observed that seamen always wish to go barefooted.

## C H A P. III.

## OF EXERCISE AND FATIGUE.

IT commonly happens in a ship of war that a great proportion of the hands is landsmen; for, besides the men required to navigate the ship, a great number is necessary to fight the guns, as well as for other duties; and as these duties admit of long intervals, their health may be affected by the want of exercise.

It has been observed before, that one use of frequent reviews and musters in a numerous crew is, to call forth men that would otherwise be overlooked, to oblige them to come into the open air, to keep themselves clean, and to prevent them from indulging in filth and laziness. It is remarked, that seamen are in general less subject to scurvy than marines and landsmen, which seems to be owing to the greater activity of their life and alacrity of their minds.

There is an essay on the causes of the pestilence, by an anonymous author, published

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at Edinburgh in 1759, in which this disease is said to be entirely the offspring of idleness; and he illustrates this by its being more apt to arise in besieged towns than any other situation; and he alledges that a false alarm of the plague will actually produce it by throwing people idle, as was the case, he affirms, when the plague was last at Messina.

There are always numbers who have been pressed into the service, to whom a sea life is new, and who are therefore prone to indolence, low spirits, and self-neglect. Men of this description are by far the most apt to fall into the scurvy; and next to the quality of the food, there is nothing contributes more to promote the scurvy than such a disposition. It is indeed both a cause and a symptom of this disease, and therefore idleness and *skulking* should be rigidly discouraged, unless the complaint is so far advanced as to render it cruel and even impossible to force men to take exercise.

The Conqueror of 74 guns, one of our squadron in the last year of the war, was an instance of a ship in which only the  
prime



prime seamen were attacked with the scurvy, and this is to be accounted for upon the same principle, for it proceeded from their having been exempted from the duty of pumping, in which the inferior classes of men were constantly employed, owing to the leaky state of the ship. Dr. Cooke, in a letter to Dr. Lind, remarks, that at Astracan the soldiers are more affected with the scurvy than the boors, and these more than the sailors, though their diet is the same, and attributes this difference to the different proportion of exercise. All who have observed or written accurately on the scurvy, concur in confirming this fact, which is of the utmost consequence, as indolence is a vice which it is so much in the power of officers to counteract.

As low spirits and indolence have such an unfavourable effect upon health, it would be wise, as well as benevolent, to promote whatever produces jollity, contentment, and good humour, so far as is consistent with sobriety and regularity. There are certain rough sports which are now almost in disuse; and whoever would revive and encourage them,  
would

would perform a useful office to the service.

A sea life frequently demands violent temporary exertions, from the uncertainty of the weather, and other incidents ; so that men are more exposed to extreme fatigue and sudden calls of duty in this than in any other situation of life. Nothing tends more to shorten life than excessive bodily labour and watching ; and it is for this reason that seamen in general are short lived, and that their countenance and general appearance make them appear older than they really are by several years. This is remarkably the case when a seaman comes to be upwards of forty ; and it has been mentioned before, that a person not acquainted with this circumstance will make a mistake of ten years in guessing at the age of a seaman from his looks.

Fatigue being therefore frequently the means of bringing on disease and breaking the constitution, as much tenderness is due to men as is consistent with the necessary duties of service. This is a circumstance in which young officers are apt to forget themselves ;

themselves; and they should take care how they *call all hands* wantonly, and oblige men to make exertions beyond their strength, especially as this will be submitted to more readily by sailors than any other set of men, from the generous alacrity of their nature.

It has already been mentioned, that fatigue, particularly in the heat of the sun, is one of the most common exciting causes of fevers in hot climates; and it was remarked, that for this reason women and prisoners were in a great measure exempt from the malignant fevers incident to such climates.

It would be well if it could be rendered convenient at all times, except in cases of danger or emergency, to put the men at three watches instead of watch and watch. By the former arrangement they have eight hours sleep and rest; by the latter only four hours are allowed, which is not sufficient for refreshment, nor is there time for them to get dry, in case they have been exposed to wet.

It would be a good rule to have as few  
men

men as possible out of bed in the night-time, unless where active service renders it necessary ; for, if unoccupied, they lie about the decks, fall asleep, and catch cold. In such situations, might not all the topmen but one remain on the fore-castle, where they might take exercise, which they could not do aloft ? I am indebted for this remark to the Rev. Mr. Ramsay, who joins to a great knowledge of the sea service a warm and disinterested zeal for its prosperity, and has been so good in several other instances as to communicate to me the results of his experience and observation.

The good effects resulting from the indulgent treatment of men are, that it encourages them to enter into the service, and to do their duty with cheerfulness and resolution. There is something more daunting to the mind of man to see his companions suffering under oppression and languishing in disease, or perishing miserably from sores or sickness, than in the terrors of fire and sword, which, as we have seen, make the least part of the calamities of war. The good treatment of seamen, in so far as it regards their health, is by no means incompatible



patible with strict discipline. Indeed strictness and even severity is necessary with seamen; for it is observed with regard to men who are used to arbitrary government, that they cannot bear indulgence and relaxation. But the steady enforcement of discipline and regularity is so far from being akin to cruelty, that it tends to prevent not only sickness but the commission of crimes, and consequently rendering the infliction of punishment less frequent and necessary. The chief excellence in the character of an officer, seems to consist in uniting strict discipline with indulgence and humanity.

## CONCLUSION.

THE subject of the preceding remarks has been the prevention of disease, and it has appeared that the means of this are not so much in the province of the medical profession, as of those who are entrusted with the direction of the navy in a civil or military capacity; and that with regard to cure and recovery also, a great deal depends upon them,

them, by their having it in their power to make a suitable provision of proper diet and cordials. The great importance of the subject will plead my excuse for again calling to mind, that such attentions are not only dictated by humanity, but would be the greatest wisdom in an œconomical and national light, considering how expensive it is to *replace* men and to support invalids, not to mention that it is upon the health and lives of men that every public exertion essentially depends, and upon which may depend not only the character of officers, but the national character and safety on the day of battle.

It must be confessed, that though there is still room for improvement, the navy is now on a better footing with regard to the health and comfort of seamen than it appears to have been in former times. The victuals were in general in the late war of excellent quality; the civil branch has shewn in many instances a readiness to adopt the means and to furnish the articles that were recommended for the health of the men\*; and

\* See Part I.

most of the commanders whom I have the honour to know are humane, attentive, and intelligent.

To conclude ; there is no situation of life in which there is room for more virtues, more conduct and address, than that of a sea officer. The men are thrown upon his humanity and attention in more views than one : they are subject to a more arbitrary exertion of power than the constitution of the state authorizes in civil life, Englishmen giving up into his hands, from considerations of public expediency, that which they hold most dear, and of which they are most jealous, their LIBERTY : it is the character of seamen to be thoughtless and neglectful of their own interest and welfare, requiring to be tended like children ; but from their bravery, utility, and other good qualities, they seem entitled to a degree of *parental* tenderness and attention from the state they protect and the officers they obey.

## APPENDIX TO PART II.

In order to exhibit a concise view of the most material observations contained in this part of the Work, a Memorial, delivered to the Board of Admiralty in October, 1781, is here subjoined.

## MEMORIAL,

Proposing Means for preventing the Sickness and Mortality prevailing among His Majesty's Seamen in the West Indies.

I HAVE for the two last years attended a squadron, consisting seldom of less than twenty ships of the line, in quality of physician to the fleet at Barbadoes and the Leeward Islands. I received, by the order of the Commander in Chief, a monthly return from the surgeon of each ship, setting forth the diseases, deaths, and other circumstances of the respective ships companies. I also superintended the hospital of the place



where the fleet happened to lie when in port. These advantages have afforded me an intimate knowledge of the nature and causes of the sickness and mortality among the seamen, both on board of their ships and in hospitals.

It appears by my returns, that there died in the course of the twelve months preceding July last, on board of ships, seven hundred and fifteen seamen and marines, of whom only fifty-nine died in battle and of wounds. There died in the same time in hospitals eight hundred and sixty-two: so that out of twelve thousand one hundred and nine men, which is the sum total of the complement of twenty ships of the line, there have perished in one year one thousand five hundred and seventy-seven, that is nearly every seventh man.

There were also sent to England in the same year, three hundred and fifty men, disabled by lameness and chronic complaints, the greater part of whom will be for ever lost to the service.

The degree of sickness is very different at  
different

different times ; but it appears by the returns, that, at a medium, there has been one man in fifteen on the sick list.

Having employed all the attention of which I was capable to find out the causes of this sickness and mortality, in order, if possible, to point out the means of prevention ; I flatter myself with being able to assign the most general causes, and to propose some effectual remedies.

When it is considered that sickness is almost entirely confined to ships of two and three decks, and that some of these are as healthy as frigates and merchant ships, though in the same circumstances of service with others that are extremely sickly, we are led from hence to infer, that sickness is not in its own nature unavoidable, and we are encouraged to hope, that the attainment of general health is within the compass of human management.

I humbly and earnestly solicit attention to some of the most material observations and conclusions which have occurred in the course of a service, which, though short,

has been extensive; and whatever is here proposed has this recommendation, that it is easily practicable, and is no addition to the public charges.

First: I hardly ever knew a ship's company become sickly which was well regulated in point of cleanliness and dryness. It is the custom in some ships to divide the crew into squads or divisions under the inspection of respective officers, who make a weekly review of their persons and clothing, and are answerable for the cleanliness and regularity of their several allotments. This ought to be an indispensable duty in ships of two or three decks; and when it has been practised, and at the same time ventilation, cleanliness, and dryness below and between decks, have been attended to, I have never known seamen more unhealthy than other men. The neglect of such attentions is a never-failing cause of sickness.

I would, therefore, with all becoming deference, suggest, that such a regulation, instead of being left to the discretion of officers, should be made a part of the public instructions. From some commanders, who  
already

already practise these rules, the advantage of them cannot to be known; and would not a public sanction not only render them general and permanent, but facilitate the duty of the officer, by making such a regulation appear a matter of legal necessity, instead of his own arbitrary act?

Secondly: Scurvy is one of the principal diseases with which seamen are afflicted; and this may be infallibly prevented, or cured, by vegetables and fruit, particularly oranges, lemons, or limes. These might be supplied by employing one or more small vessels to collect them at different islands, and such an expedient would prevent much sickness, and save many lives. I am well convinced that more men would be saved by such a purveyance of fruit and vegetables, than could be raised by double the expence and trouble employed on the impress service; so that policy, as well as humanity, concur in recommending it. Every fifty oranges or lemons might be considered as a hand to the fleet, inasmuch as the health, and perhaps the life, of a man would thereby be saved.



Thirdly: The use of wine, in place of rum, has been found extremely conducive to health. In the course of my observation I have met with the most unquestionable proofs of the benefit that would arise from this substitution. It is a farther reason for such a change, that good rum is seldom or never supplied in the West Indies.

Fourthly: The necessaries provided for the sick by the present establishment are not at all adequate, especially on a distant station, where the supply is not regular, and the quantity at best is such as can contribute but little to their comfort and recovery. An ample provision might be made for the sick, without any additional expence, in the following manner;

It is a rule in the service, that though men are sick, their ordinary allowance of salt meat and other victuals is nevertheless served out, and is either used by the other seamen, who stand in no need of it, or is wasted. Now, if the purfers were instructed to provide themselves with certain species of necessaries, such as Madeira wine, sugar, rice, and dried fruits, to serve to the sick, in  
place

place of rum, and the common provisions of the ship, such a regulation would be productive of the very best effects, in recovering the health, and preserving the lives of those men who have the misfortune to be taken ill in a situation necessarily destitute of most of the comforts that can alleviate their sufferings. I cannot help here applauding a late regulation, by which melasses are substituted for part of the oatmeal; for the quantity of the latter heretofore legally allowed was so much greater than what was necessary, that one half of it has commonly been wasted.

It is to be observed, in general, with regard to the West Indies, that ships on service are to be considered, in a great measure, in the light of ships constantly at sea; for, excepting the island of Barbadoes, there is no other port in which fresh meat and vegetables can be procured in any quantity, and therefore sour krout, melasses, and such other articles of antiscorbutic diet as can be supplied on board, are absolutely necessary. Fleets could hardly exist here, were it not that a warm climate is naturally more unfavourable to the scurvy than a cold one.

Fifthly :

Fifthly : Though the health of a ship's company depends chiefly on diet, and that discipline and order which is the business of officers, yet much depends also on the medical art, particularly in the West Indies ; and as surgeons frequently cannot do justice to the men without wronging themselves, in a country where the price of every thing is exorbitant, and medicines often unsound, Government would find its account in supplying gratuitously some of the most costly articles, particularly Peruvian bark in a fresh state from time to time, from England.

Sixthly : It is now the general custom to send every sick person on shore to an hospital ; where there is frequently worse air and worse accommodation than on board, from overcrowding the apartments. Contagious diseases, though not so common as in Europe, are here often mixed with those that are not so, whereby numbers are infected and carried off ; and, besides this, the land air is infinitely more unwholesome in the West Indies than the air at sea or in a road. The scurvy is perhaps not at all contagious, nor is it very difficult of cure ; but a number of cases of it terminate fatally from the flux or fever,

fever, caught either by contagion in hospitals, by the noxious influence of land vapours, or by intemperance. I beg leave, therefore, humbly to suggest, that as few sick as possible of any disease, but what is contagious, be sent to hospitals, and that some method be established for the supply of vegetables and other refreshments to the sick on board of their ships.

Seventhly : Crowding, filth, and the mixture of diseases, are the great causes of mortality in hospitals. There should be a space of five hundred cubic feet allowed for each man ; and in general the sick had better remain on board than be crowded beyond that degree ; or relief should be provided to the hospital by an hospital ship, which, for reasons already given, is preferable to any accommodation on shore ; and such an institution would be more particularly proper for the reception of convalescent men.

I would beg leave, therefore, earnestly to recommend that cleanliness, the separation of diseases, and a competent space, be regularly enjoined and strictly enforced in hospitals ; and in order to make this more practicable



practicable in the great scale of service now going on, I would farther propose that hospital ships be established for the reception of the sick or recovering. I know from extensive experience and close observation, that these circumstances are more essential than even medicine and diet.

These are a few remarks extracted from a series of observations, and derived from great opportunities of experience. Many other remarks would suggest themselves; but I purposely confine myself to what is highly important, and easily practicable, with little or no addition to the public expence. Some of the improvements recommended are indeed an immediate, and all of them will be an eventual, saving to the public.

The alterations that have been proposed are,

1st, The establishment of a certain method and discipline, in order to secure regularity and cleanliness among the men, and to render the ships clean and dry.

2dly, The supply of fruit and other vegetables for the cure of the scurvy.

3dly,

3dly, The substitution of wine\* for rum.

4thly, The providing of an adequate quantity of necessaries for the sick.

5thly, The gratuitous supply of certain medicines.

6thly, The curing of certain diseases on board instead of sending them to hospitals; and,

Lastly, The preventing of filth, crowding, and the mixture of diseases in hospitals, by proper regulations, and by establishing hospital ships.

I beg leave again to call to mind, that 1,518 deaths from disease, besides 350 invalids, in 12,109 men, in the course of one year, is an alarming waste of British seamen, being a number that would man three of His Majesty's ships of the line; and what I advance is from a real conviction that a due attention to the above-mentioned propositions would save more than two thirds of

\* Had I then known the salutary effects of porter and spruce beer, of which I have since been convinced, I should have proposed them as substitutes for rum.

the seamen that would otherwise die in that climate. It was to set this in a proper light that I requested leave to quit my duty during the absence of the greater part of the squadron in the hurricane months: and should any thing I propose meet with public approbation, and be carried into effect, I should esteem it a recompence far above any other gratification I can derive from the service.

LONDON,  
October 13, 1781.

To the Right Hon. the Lords Commissioners  
of the Admiralty.

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Next year the following Supplement to the preceding Memorial was sent to the Board of Admiralty:

SUPPLEMENT to the MEMORIAL delivered  
last Year to the Board of Admiralty.

SINCE my return to my duty on this station, additional experience has afforded me farther practical confirmation of the utility of the former proposals.

The

The great squadron employed on this station has, by the attention of the Commissioners of Victualling, and also of the Commander in Chief, been supplied with most of the articles recommended, in such quantities as to prove their efficacy; and indeed the small degree of mortality in comparison of former times, is a sufficient demonstration of this.

I beg leave to give an instance, in the *Formidable*, of the great and salutary effects of the proposed improvements. This ship left England, furnished not only with four krout and melasses, in common with most others in the squadron, but what was peculiar to herself was, an entire supply of good wine in place of spirits; and an experiment has been made in this instance, under my own eye, to ascertain what degree of health it was possible to attain in a great ship in this climate. With the above advantages, together with good discipline and medical care, no man\* died of disease from December,

\* The authenticity of this fact, as well as every other assertion in this work relating to the mortality in the fleet, may be proved from the ship's books, deposited at the Navy Office.



1781, to May, 1782, and only thirteen were sent to hospitals, whose complaints were small pox and ulcers. In the months of May and June last, when at Jamaica, there died of disease in this ship three men, and seventeen were sent to the hospital, most of whom had contracted their sickness on board of French prizes.

In the rest of the fleet the health was in proportion to the wine and other refreshments, and the cleanliness, good order, and discipline observed.

In the squadron I attended the last five months, which seldom consisted, during the last three months of that time, of less than forty ships of the line, there have died of disease about 350 men, and about 1,000 have been sent to hospitals; a degree of sickness and mortality which, though not greater than what frequently prevails in Europe, I am persuaded would have been still less, had the improvements proposed been complied with in a manner more extensive and complete, and had the general rules of discipline and cleanliness been kept up with due and equal strictness throughout the fleet.

This

This last article, which, being the most important, I have placed first in the preceding memorial, it is only in the power of supreme authority to enforce ; and my additional experience and observation have so far confirmed me in the opinion of the utility of this, as well as the other articles, that I hope to be again pardoned for repeating my humble and earnest solicitations that these regulations may be farther extended and enforced.

FORMIDABLE,  
At Port Royal, Jamaica,  
July 16, 1782.

## P A R T III.

## DESCRIPTION AND TREATMENT

## OF THE

## D I S E A S E S

## MOST COMMONLY OCCURRING AT SEA.

**I**T was mentioned in the Introduction to this work, that though my opportunities of experience were extensive; several obstacles had prevented me from making observations so accurately as could have been wished. These were chiefly the bad accommodation of the sick at some of the hospitals, and the shortness of our stay at any one place, which seldom exceeded six weeks or two months, and prevented me from completing such observations as I happened to be engaged in. But having practised among great numbers, observations necessarily arose from the comparison of so many cases; and amidst the variety of situations connected with

with the emergencies and hardships of war, nature is seen in certain positions and under certain trials which are not met with in common life. I shall therefore describe the diseases such as they occurred, and shall add such remarks on practice as I could ascertain.

The following observations shall be confined chiefly to what I have called the sea epidemics, viz. Fevers, Fluxes, and the Scurvy.



## CHAP. I.

## Of FEVERS.

THOUGH it is impossible to refer every particular case of fever to a distinct class, on account of the mixed and anomalous symptoms that arise, yet there are certain distinguishing features which afford sufficient ground for dividing them into different kinds, and such a division will at least serve to facilitate description, and serve as an outline in laying down the principles of practice.

The fevers which occurred most frequently on board of ships, and at naval hospitals belonging to the fleet in which I was employed, were the infectious ship fever, (which is the same with the jail and hospital fever or typhus) the bilious remitting fever, and the malignant yellow fever.

## I. Of the infectious SHIP FEVER.

This does not occur so frequently in hot as in cold climates, both because it is the disease of ships newly fitted out, which they seldom are in the West Indies, and because there is something in the warmth of a climate which prevents the production of contagion, as has been formerly remarked. But as great fleets arrived from time to time in the West Indies from Europe, with numbers of men labouring under this fever, there were sufficient opportunities of making observations upon it.

It has been so well described by Sir John Pringle, Dr. Lind, and other writers, that it is unnecessary to enter into a minute detail of all its different appearances in its several stages; and I shall content myself with recounting some of the most distinguishing symptoms, and with marking the peculiarities that arose from the influence of the climate.

This fever is extremely various in its symptoms and in its degree of malignity

and fatality. We are told in some of the histories of the jail distemper, that, upon its first attack, few escaped that were seized with it; but that afterwards it grew more mild; and it has been already observed, that the contagious poison of fever differs from that of small-pox and other specific infections, by varying in its degrees of virulence.

There are, however, certain characteristic symptoms pretty constant in this fever in all its forms.

One of the most remarkable of these is a greater degree of muscular debility than what takes place in other fevers, and it deserves to be mentioned first, as being one of the most constant. It is also a tolerably true index of the degree of malignity, the danger being in proportion to this symptom. In the more advanced stages of the fever, a tremor of the hands, and of the tongue when put out, is a constant symptom, and seems to be connected with this weak state of the muscular fibres. I have seen, however, extreme debility without tremor in cases too of the greatest danger, and it was observable in these that there was little or no delirium.

Another

Another striking character of this fever is the delirium of a particular kind which usually attends it. Sensation and reason are here in a state uncommonly depraved; and it is in this sort of fever oftener than any other that we find a total deprivation of them in the symptom called *coma*. The delirium is seldom of a wild, ungovernable kind, such as occurs in inflammatory continued fevers, in the violent paroxysms of intermitting and remitting fevers, or in inflammations of the brain. It is, however, connected with great suffering; and this consists in anguish rather than pain, shewing itself by outward tremor, agitation, and what is called the *floccorum collectio*; also by sighing, mumbling, and moaning, symptoms always indicating danger.

Delirium is a symptom, to the nature and appearances of which, I have been particularly attentive, in consequence of a painful and diligent attendance upon some cases in which I was particularly interested from friendship and affection, and in which this was a remarkable symptom. It seems chiefly to consist in a false reference of our sensations, whether external or internal; and this



is in no sort of fever more evident than in this. When any painful impression, for instance, is made by an external body, the patient, if in a state of delirium, does not refer it justly to the part affected; but the general agitation and incoherence of sentiments is aggravated for the time. I have known a degree of heat applied to the extremities sufficient to blister them, yet the part did not shrink, though the raving and general uneasiness were increased. In like manner, with regard to internal sensations, when an irritation is excited to expel the urine or *feces*, the mind does not recognize it as such, but from a sense of uneasiness, probably mistaken for something else, an effort is made to relieve nature, which is done without a proper consciousness, and certain symptoms are produced which are well-known marks of danger in this fever. In watching those who have been under the influence of delirium, I have observed it increase when any particular want of nature urged, and this would continue for some time, the patient being incapable of procuring himself immediate relief on account of the false reference of sensation that has been mentioned; but he would become calm  
after

after voiding the urine or *feces*, or after receiving something to drink, according to the particular want that was present at the time. So great is the disorder in the common course of sensation in this fever, that a person ill of it has been even unconscious of inflammations of vital parts, which, in the natural state of the nerves, would have excited the most acute pain, and would have been distinctly referred to the part affected, but were not discovered nor suspected till inspection after death\*. I remember one case in which there were found large erosions, and even holes in the intestines, without any preceding complaint that could have led to suspect such an appearance. It would appear that the motions excited in the brain and nerves in such cases, instead of producing the sensations naturally belonging to

\* I fancied that my reasoning on this subject was in a great measure new; but I lately met with the following passages in Celsus and Hippocrates, which seem to be illustrative of the same idea:—*Quibus causa doloris, neque sensus ejus est, his mens laborat.* Celsus, Lib. ii. cap. vii. which is nearly a translation of the following aphorism of Hippocrates:—*Ὁκοσοι πονεοντες τι τῷ σώματι, τὰ πολλὰ των πονων ἐκ αἰσθανοντα, τῆς τοισιν ἡ γνώμη νοσεί.* Hippoc. Aphor. Lib. ii. Aphor. 6.

them,

them, serve to excite disagreeable emotions of a different kind, in which delirium consists. It seems to be from the same depraved state of sensation, that when a phthical person is seized with this sort of fever, his cough is for the time suspended. I have seen the same circumstance occur in a maniacal case. From a like cause it sometimes happens in dangerous cases of fever, that in the height of delirium the *epiglottis* loses its natural irritability, so that liquids in the act of swallowing are apt to get into the windpipe, so as to excite coughing and threaten suffocation, as I have observed in some cases that came under my care.

It sometimes happens, as I have observed in watching closely the workings of delirium, that the patient not only makes a substitution of one suffering for another in his own person, but transfers it to another, fancying that it is some by-stander or some absent friend who is the subject of suffering, and his own distress arises from sympathizing with him. In this case he may be said to lose his sense of personal identity or individuality.

All

All these different forms of delirium are signs of a body extremely disordered in its functions, and forbode great danger.

The next symptom I shall mention as most characteristic of this sort of fever is, the spots known by the name of *petechiæ* and *vibices*, which, though far from being constant, are, perhaps, more peculiar to it than any other symptom. They occur only in the latter stages of the disease, and in cases of considerable danger. The common opinion concerning their cause is, that the blood is in such a dissolved state, that the red part of it is effused into the cellular membrane. The appearance in such bodies as I have inspected, seems to favour this opinion; for there was hardly any coagulation of the blood in the great vessels, and instead of those firm substances, called *polypi*, in the heart, there were only soft grumous bodies, which were so tender in their consistence, that, upon being handled, they, as it were, dissolved. Since the improved method of treating these fevers has been generally adopted, this symptom seldom occurs; for in most cases it may be called an  
artificial



artificial symptom, chiefly arising from close apartments, and the heat of bed clothes.

It may be considered as a peculiarity of this fever, that it is more indefinite in its crisis than most others. In continued fevers of the inflammatory kind, there are frequent attempts at remission, there are certain periodical exacerbations, and there is generally a distinct crisis marked by a freedom of the secretions and turbid urine: but in the fever of which we are treating, though the patient is generally somewhat worse towards the evening and during the night, its course is more equable, and the transition from sickness to health is insensible and gradual, being seldom marked with any perceptible crisis.

The symptom next to be taken notice of, though a minute one, is very constant and characteristic in this sort of fever. It is a peculiar heat in the skin, communicated to the hand of another person. It is usual to grasp the wrist of the patient after feeling his pulse, in order to examine the state of the skin in point of heat and moisture; and  
in

in doing this a glow of heat is impressed on the palm of the hand, which lasts for some hours, if one should neglect so long to wash the hands. I have never met with this symptom in any of the sporadic fevers of England, though I am informed it sometimes occurs in these.

The fever we are treating of differs also from the sporadic nervous fever of England, and from most others of the continued kind, in being attended with a more copious secretion of bile, which, when thrown up, is generally green, or, as it is otherwise called, of a porraceous colour. This symptom takes place in all climates ; but is more remarkable in a hot climate, as might be expected.

These are the chief characteristic symptoms of this fever. I shall next point out such modifications of it as occurred in the West Indies from the influence of climate.

In the first place, when this fever prevailed on board of any ship that arrived from a northern climate, it was soon after succeeded by, or, as it were, converted into, a dys-

sentery; for those ships that arrived either from England or North America with the greatest stock of feverish infection, were the most subject to fluxes, after being two or three months in the West Indies. This was formerly made use of as an argument, to prove that the dysentery proceeds from the same cause with fever, taking a different determination, from circumstances of climate, constitution, and accidental infection.

Secondly, It sometimes happens that men, under the influence of this infection, are more apt than others to be affected with symptoms peculiar to the climate upon their first arrival. A very striking instance of this has been mentioned in the case of men that were pressed into the Formidable at New York, some of whom had the common ship fever on the passage; others, upon our arrival at Barbadoes, were seized with the yellow fever, and were the only men in the fleet who had it at that time. There was another instance in the recruits brought from England by the Anson, who were seized with a fever on board of the Royal Oak; and in this fever the skin and eyes were

were yellow, though without any symptoms of malignancy \*.

Thirdly, It happened in some ships † that the infection was kept up for several months after arriving in the climate, from a neglect of cleanliness, or the want of an opportunity of removing those who were infected to an hospital. It did not in these take a dysenteric turn, as in most of the other ships; but differed from the ship fever of colder climates, as above described, in some particulars, which I shall here enumerate. All the symptoms were milder: it was more protracted, and less dangerous. In the beginning there was but little difference, only the symptoms were less violent; but in the succeeding period of the disease the pulse deviated very little from the natural standard, and the skin felt cold and clammy. The tongue was white; and this did not seem so much owing to any fur covering it, as to its being itself of a pale, lifeless colour, as well as the face, and it appeared larger in size than natural. The teeth were clogged

\* See page 148.

† See pages 86 and 87.

with.



with a white fur. Those affected with this fever were subject to faintings, and had a constant uncomfortable languor and listlessness. Most of them had a deep-seated pain in the occiput, and an oppression at the stomach, but without any inclination to vomit. The unfavourable symptoms were *coma*, *delirium*, and a yellowness of the skin. I never remember to have seen *petechiæ* in any of them. The favourable symptoms were a warm moisture, or a miliary eruption on the skin, and a gentle *diarrhœa*, which, however, if neglected, was in danger of degenerating into an incurable flux. A great number were seized with this fever in the Alcide, in July, 1783, and what is remarkable, most of them had the tape worm, as I was informed by Mr. Telford, the surgeon of that ship, who frequently obliged me with valuable remarks; and he observed also, that it was evidently infectious, and that the skin communicated the same disagreeable feeling to the hand as was mentioned above.

Though the inflammatory fever does not often occur in hot climates, yet, as it is of great consequence to distinguish it in all cases

cases from the infectious fever of which we are treating, it may not be improper, nor uninformative, here to point out the most remarkable differences. There is more resemblance in their symptoms, especially towards the beginning, than might at first be supposed; and as it is very material to avoid error with regard to the practice, which, in these two sorts of fevers, ought to be very different, and even opposite, I have taken particular pains to discriminate them.

The continued inflammatory fever is very uncommon in the West Indies; but in the form in which I have met with it in North America and England, there are cases in which the blood is fizy during the whole course of the disease, even without local affection, though, in general, there is more or less rheumatism, or pulmonic inflammation. The symptoms which chiefly distinguish such cases from the fever before described are, a greater degree of muscular strength, a more violent delirium, pale urine, a more parched tongue, and skin, greater heat and thirst, and a pulse more frequent and strong, with a particular sharpness. There is another symptom sometimes

A a

occurring

occurring, which I consider as strongly characteristic of a fever of an inflammatory nature. This is a watery diarrhœa, without *feces* and without gripes, the stools consisting chiefly of the drink as it was taken in. There seems here to be a suspension of the power of absorption as well as of some of the secretions in the bowels, for there is hardly even bile or mucus in the stools. There is also a particular appearance of the mouth connected with this type of fever, which is better learned by the eye than by description. It consists chiefly in a want of moisture on the lips, and a dryness and shining appearance of the teeth. With these symptoms, it will be found that the patient will bear the lancet in very advanced stages of the disease. These fevers seldom occur but in a sporadic way, unless when there is some peculiarity of season, as at New York in autumn, 1782. They are also more frequent among the better than the lower sort of people \*.

By

\* It seems probable that the principal difference of the inflammatory fever and the low fever consists in the different degrees of tension in the vascular system. All the soft fibres in a living animal body, but especially those

By comparing these symptoms with those of the infectious fever above described, there will appear an obvious difference in their nature, and evident reasons for varying their treatment.

### TREATMENT of the SHIP FEVER.

WHEN the body is thrown into disorder by an attack of fever; the first step to be taken is to clear the stomach and bowels of their crude and acrid contents, consisting either of the food imperfectly digested, or the depraved natural secretions. So great is the disturbance produced by such offending matter, that, when nature is freed from this embarrassment, the functions of the body

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those of the muscles and blood vessels are at all times in a state of more or less tension; so that if mechanically divided, they would shorten themselves. An inflammatory state of the body consists in an increased degree of this tension in the vascular system, producing stronger action and increased heat, and it is removed by those remedies which evacuate and relax; such as blood-letting, neutral salts, and antimonials. It might be shewn that other diseases depend on a morbid laxity of the vascular fibres; but this would lead to a discussion too long for this place. See Baglivi *de fibra motrice et de morbis solidiorum*.



body are frequently by this alone restored to their proper exercise, and a remission produced. It seems probable also, that this evacuation proves salutary not only by removing the morbid stimulus, but by preventing the absorption of corrupted or ill-concocted juices into the mass of blood, which would tend still farther to derange the functions of life. But perhaps the circumstance that first suggested the utility of evacuating the stomach, as the first step in the cure of fevers, was the nausea so common in the beginning of them, which may be considered as a natural indication of this practice. It farther appears rational, that, as acute diseases generally come on suddenly, and find the body in a state of repletion from the recent *ingesta*, the most obvious means of relief should be to free the bowels, and particularly the stomach, from what is foreign and oppressive to it. It seems also probable, that the *nausea* and the act of vomiting have a salutary effect independent of evacuation; for I have seen relief produced from these when nothing was evacuated. Such, indeed, is the great and universal influence and sympathy of the stomach, that the operation of vomiting affects every fibre  
of

of the body, and has been known to resolve tumors in the most distant parts. Nausea, by whatever means it is produced, tends to relax all the fibres of the body, and while it continues, the pulse is always slower. An early administration of an emetic is therefore the first step to be taken in the treatment of this as well as most other fevers.

If it is given in small divided doses, it will most probably evacuate the bowels downwards; and the most convenient form for this purpose is a solution of emetic tartar. If it should not have this effect, some brisk purgative medicine should be given soon after the operation of it,

I mention these evacuations before blood-letting; for though this ought to be first in those cases in which it is proper, it is here seldom necessary, and we may pronounce it to be a remedy very ill adapted to this sort of fever, particularly in a hot climate. It sometimes happens, however, that there is violent head-ach, pain of the back and limbs, with a throbbing pulse. These symptoms may in the very beginning justify blood-letting; but as they are only symptoms of

general fever, they cannot be said to demand it, unless there is at the same time local inflammation.

The next means of relief I shall mention, and also the most probable means of cutting short the disease, is to excite universal sweat. This being an imitation of nature, is founded on reason as well as experience ; for it is by sweating that the fit of an intermittent is relieved and terminated ; and continued fevers in general, if not always, begin with a fit of the same kind. A dry skin, accompanied with heat, is one of the most constant as well as troublesome and uneasy symptoms in all fevers ; and it would appear from the peculiar heat of the skin in this sort of fever, that there is either a more than common acrimony of the matter of perspiration, or something peculiar in the mode of circulation on the surface of the body. Sweating does not seem to operate entirely by the evacuation of acrimony, for no relief is procured by it if it is partial ; and it is evident from a number of facts that the state of the brain and *viscera* depends on that of the external surface of the body ; for a free state of the pores of the skin,

skin, provided it is general, tends more than any other circumstance to relieve internal pain, and also to take off delirium. The good effect of sweating seems, therefore, chiefly to depend on a general relaxed state of the small vessels on the surface of the body; and it ought to be effected, if possible, by gentle, soothing means, and not by such regimen and medicines as heat the body and accelerate the circulation. This intention is best answered in the beginning by moderate doses of antimonial medicines, and either the \* antimonial powder or tartar emetic may be employed. The first is a more certain sudorific, being less apt than the other to run off by the bowels; and its effect will be still more certain, if accompanied with a mild opiate, rendered diaphoretic by † *spiritus Mindereri*, which will both prevent the antimonial from acting roughly, and will determine its operation to the skin.

\* The antimonial powder of the last edition of the London Pharmacopœia, has, during this war (1798) been substituted for the James's powder, and found to answer equally well; but being one third stronger, ought to be given in doses proportionally less.

† The aqua ammoniæ acetatæ, of the last edition of the London pharmacopœia.



A sweat kept up by these means, together with plentiful warm dilution, from twelve to twenty-four hours, is the most probable means of bringing about a complete remission of the fever; and in this case a fresh accession is to be prevented by the immediate administration of the bark,

These are the means proper for stopping the fever in the beginning, or tending to render its future progress more safe; and though, with this view, free evacuations have been recommended, yet, if the fever should go on, great caution is necessary in this respect in the future treatment, debility being the symptom chiefly to be guarded against. Purgatives may, indeed, be occasionally necessary, in consequence of accumulations of bile taking place; but, in general, the evacuations by stool should not be more frequent than in health; and some of the cases which were most unmanageable and fatal, were those in which there was a spontaneous *diarrhœa*. With regard to blood-letting, it is always hurtful after the first two days, unless some inflammatory affection of a vital part should arise.

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The natural evacuation, which may with most safety and advantage be solicited and encouraged in this disease, is, that, by perspiration: and it is observable, that in those cases for which nature does most, there is a universal warm sweat, which has generally a very offensive smell, and seems to be a salutary effort of the constitution to cure the disease. Where this takes place, little medical assistance is necessary, except to keep it up chiefly by warm dilution; and there is no circumstance in which the judgement of a physician is shewn more than in discerning those cases in which his chief business is to look on, where nature, being equal to the task, ought not to be disturbed by the active and officious interposition of art. We should not, however, aim at producing a profuse sweat, except with a view to effect a remission immediately after the first evacuations. In the course of the disease, it is only necessary to keep up a gentle moisture or softness of the skin.

The head being particularly affected in this sort of fever, the patient is extremely restless and delirious, especially at night; and there is a medicine which has a most pleasing

pleasing effect in procuring both rest and perspiration. This is a combination of an opiate with an antimonial medicine, which was administered in the evening with great success; and the sudorific effect is rendered more certain by the addition of some saline neutral, especially *spiritus Mindereri*. I tried pure opiates in the early stage of this fever, but found them not to answer; though in the low fevers of England, and in the advanced stages and convalescent state of this fever, they are extremely safe and useful. This, as well as every other point of practice must be varied and modified according to the constitution, previous habits, and external circumstances. In England, for example, it is found that we can with propriety give opiates in the early stages of this fever to the lower orders of people who have been accustomed to low living and hard labour, but that antimonial, saline, and evacuant remedies are necessary to the more affluent, at the same stages of this disease. The diversity observable in the operation of this medicine may also in part be owing to this circumstance, that opium of all other drugs, is most various in its effects upon the constitutions of individuals. Pure

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laudanum



laudanum is also given by Dr. Lind, at Haflar, with great success in the height of the disease; but in the West Indies there is a greater tendency to acrid excretions, and the effect of pure opium in causing a retention of these, seems to be the cause of its more frequently disagreeing in that climate in the first stage of this fever,

It may here be observed, that the addition of a little neutral salt alone will sometimes so qualify the operation of opium, as to prevent its bad effects, such as the increase of febrile heat and delirium, and the stupor and head-ach which, when given alone, it frequently induces the following day. I have generally employed nitre with this intention; but this does not seem so well adapted to this disease as some other neutral salts, as it tends too much to lower the powers of life.

But with a view to perspiration, the *spiritus Mindereri* is the most effectual neutral medicine when conjoined with an opiate, and there is not, perhaps, a more safe and pleasing diaphoretic known than a combination of it with syrup of poppies. There is  
some



some neutral salt in \* Dover's powder, and this has more effect than could be expected from so small a quantity of an inert medicine; for I know from trials of my own, as well as those of others, that ipecacuanha and opium given together, in the proportions prescribed in that powder, will not have the same effect as when joined with the neutral salt. This is an instance of those useful combinations of medicines which can be discovered only by experience, but which every physician ought gladly to adopt in practice upon good testimony and fair trial, though he may not be able to account for their effects, nor to explain their mode of operation. It is, probably by reducing the heat and diminishing the action of the vascular system, that neutral salts and ipecacuanha render opium applicable in the cases mentioned above.

It is important that there should be plentiful warm dilution; and the infusion of sauge, or any such light aromatic, is rather more proper than farinaceous decoctions, or any compositions in which there is wine or spirits. Success in this, as well as other

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\* The *Pulvis Ipecacuanhæ compositus* of the present London Pharmacopœia.

diseases, depends on attention to nursing as much as upon medicine; for what would it avail here to administer medicines for promoting perspiration, unless they were assisted with fluids to allay thirst, to dilute the acrimony in the first passages and in the vessels, and to furnish the materials of free perspiration?

But however desirable it may be to procure sweat, this is never to be attempted by close rooms and bed clothes, nor at this stage of the disease, are heating medicines, such as volatile salts, serpentary, spirituous tinctures, or aromatics advisable, though sometimes very useful in the low and advanced state of it. All these stimulating methods and medicines do at this time, according to the testimony of Sydenham, tend to increase the heat and delirium, and to produce *petechiæ*, miliary eruptions, or local inflammations. In the intervals of the anodyne diaphoretic above described, *spiritus Mindereri* and small doses of camphor, with proper dilution, may be safely employed to procure a soft skin. The principal virtues of camphor are those of a cordial and diaphoretic. It ought to be given dissolved in a watery vehicle, for in a solid form, as that of a bolus, it proves offensive and irritating to the stomach.

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The only other means I shall mention with this view is, the application of warm moisture to the surface of the body, which may be done by soaking the feet and hands in warm water, or by fomenting the feet and legs with stupes. This does not answer except where there is a soft pulse and no great increase of heat. Warm pediluvia is manifestly hurtful in inflammatory affections, particularly those of the lungs. Where this operation is proper, it has the effect of bringing on a general relaxation on the skin, thereby taking off febrile agitation and delirium, and inducing sleep. It must be remarked, however, that this practice would be improper in the inflammatory fever above described, by its tendency to stimulate the circulation and increase heat\*.

Delirium is one of the most constant and alarming symptoms in this disease, and the removing

\* The only other remedy worth notice in these continued fevers, is the affusion of cold water; but as I have no proper experience of it myself, I have made no mention of it in the text. There is a treatise lately published on this subject by Dr. Currie of Liverpool, who seems to have judiciously discriminated the cases in which it is applicable;

removing of it depends much upon the attendants as well as the physician. It has been said before, that it depended on a false apprehension of the impressions or natural sensations.

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applicable; and as the attention of the public is at present much awake to it, it will probably be soon decided whether it is really a valuable remedy, or only one of those to which novelty and fashion give a temporary currency. The only reports with regard to its employment in this fever from practitioners connected with the sea service, are those of Dr. Armstrong of St. Kitt's. In treating the seamen put under his care at the Island above mentioned, who laboured under the typhous fever, he used the cold bath in a vast number of cases with evident good effect, and affirms that it removed restlessness, anxiety, and irritation of stomach, and that the men themselves were so sensible of the relief it afforded that they would call for it in the night.

The rules laid down by Dr. Currie for regulating the practice of cold affusions are, that it may be safely used where there is no sense of chilliness when the heat of the surface is steadily above what is natural, and when there is no general or profuse perspiration.

I have in some cases of private practice applied clothes dipt in cold vinegar and water to the hands and arms with evident relief.

That it is not always safe I had a proof in one case in the West Indies; having seen it prove immediately fatal to a black girl, who bathed in a brook during the eruption of the small pox.



sensations: When a person, for example, labours under delirium, and is affected with thirst, the mind is either so agitated with other objects, that this sensation is overlooked, or, instead of producing a craving for drink, it excites some other disagreeable emotion in consequence of the disordered state of the *sensorium*. This last seems to be probable from the cessation of delirium, which will take place upon any natural want being satisfied. I have seen a temporary stop put to the patient's raving by making him drink; or upon his discharging his urine or *feces*; for he is then unconscious of thirst and other natural wants, is therefore ignorant of the means of satisfying them; and when he does so, he fancies he is about something else which is the subject of his delirious thoughts. This observation leads to a material practical purpose; for it follows from it, that unremitting attention should be given to the patient's feelings and all his possible wants, as those natural notices and instinctive cravings which occur in health are now wanting, in consequence of the depraved state of sensation.

In the course of this fever a change of symptoms generally takes place which demands a different and even an opposite treatment to that which was proper in the commencement of the disease. This change consists chiefly in a great diminution of muscular strength, of the vigour of the circulations, and in the degree of heat. The periods at which these take place is very various. Sometimes the fever has this low character from the beginning, in other cases it never takes place, so that a treatment in some degree antiphlogistic is necessary throughout the disease. And this accounts for the various and opposite accounts we have of the treatment, in which both parties may be in the right, and discrimination only is wanted. In general, this transition takes place about the end of the first week, and the principal remedies thereafter are, blisters, Peruvian bark, opium, and wine.

I have found what Dr. Lind says concerning the efficacy of blisters confirmed by my own experience, especially in those fevers in which there was great delirium, *coma*, and head-ach; but I have not experience enough to say whether they were as useful in the

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beginning of the disease in the West Indies as he found them to be in England\*.

The men that were brought from the ships to the hospitals were affected with the disease in various stages ; but as we had in general a very inaccurate history of the several cases, the method of treatment upon their first admission was pretty nearly the same in all ; and it consisted, in the first place, in washing their face, hands, feet, and legs, with warm water and vinegar, from which they derived the greatest comfort, being commonly very dirty. There ought to be a warm bath at every naval hospital kept in constant readiness, as is now the practice at the royal hospitals in England ; for there are so few conveniencies on board of a ship for preserving bodily cleanliness among the sick, that the surface of the body becomes loaded with filth, so that the operation of the warm bath cannot fail to be highly comfortable and salutary as the  
first

\* It may be remarked as a point of humanity, that the scarf skin should not be removed from a blistered part, as it is a defence from a great deal of extreme and unnecessary suffering, which no artificial application can equally prevent.

first step to their cure when brought on shore. We had generally very indistinct information about the state of their bowels, as well as other circumstances, on account of their delirium; but it was at any rate useful, or at least safe, to give them a clyster. They were enjoined plentiful dilution; and if they were low, some wine and water was allowed. In the evening, the anodyne diaphoretic medicine was administered, and a blister applied to some part of the body. In consequence of this method, we seldom failed to find the patients better next morning; and it was tried in such numbers, that the efficacy of it was sufficiently ascertained. It happened in some cases, that these means were omitted, and a comparison of these with the others served to ascertain the true efficacy of the medicines; the stationary or aggravated state of the symptoms, when the disease was thus left to itself, sufficiently proving the propriety of the treatment above described.

It is an important question to what circumstances of this fever the Peruvian bark is adapted. An early and indiscriminate use of it is recommended in some late publica-



tions, upon the authority of which I tried it without regard to the stages or symptoms, and without any prejudice either for or against the practice; but I found that this powerful remedy was in danger of doing much harm, unless great attention was paid to the circumstances of individual cases, in order to ascertain the proper seasons for giving it. The symptoms that forbid the use of bark are chiefly foul bowels, hard pulse, fizy blood, great delirium, dry tongue, a hot and dry skin, and inflammatory affections of the viscera. It was found extremely pernicious in an early stage of the disease previous to evacuations; and the object of practice at this time should be to relieve the habit by means of these, in order to produce a general relaxation of the secretions, and to render the skin cool and soft, thereby paving the way for the bark.

It is not necessary, however, especially in the advanced stages of the disease in this climate, to wait for an absolute remission, in order to administer the bark. In a cold or temperate climate, the cautions above mentioned should be strictly attended to; but in a hot climate it is sometimes admissible

admissible where there are symptoms of general debility, such as a small pulse and muscular weakness, though there should be frequency of pulse, delirium, or even a dry skin and tongue. The symptom which forbids the use of bark more absolutely than any other, is an inflammatory or dysenteric state of the bowels, in which cases it seems to be invariably pernicious.

Where it happens that we are extremely anxious to throw in the bark, as we usually are in the West Indies, where fevers are very rapid and dangerous, and yet the symptoms seem hardly to admit its use, it was very commonly tried either in conjunction with some antimonial medicine or neutral salt, or these were given alternately with it, in order to soften and qualify its effects by preventing it from heating or otherwise aggravating the symptoms. Antimonial wine or *spiritus Mindereri* were conveniently employed with this intention.

With regard to the quantity of bark to be given, it may be proper in doubtful cases of this kind to begin with small doses, in order to feel how far it agrees or not; but in ge-

neral it may be laid down as a rule with regard to this medicine, that, where it is really proper, and the medicine to be depended on, it is to be given in as large doses and as frequently as the stomach will easily bear it.

The next remedy mentioned was opium. It is a medicine more admissible and useful in this than any other kind of fever; and it is from the good effects I have seen from it, in restoring and supporting the powers of life in this species of fever, that I have been led to consider it as one of the first cordials in nature. The same cautions nearly apply in the administration of it as have been given with regard to the Peruvian bark, though it is here more generally admissible and useful. The caution with regard to foul bowels is particularly necessary in a hot climate, where an over secretion of bile is so apt to take place. When the Boreas frigate arrived from England in March 1783, there was a very bad fever of the infectious kind on board, some cases of which being sent to the hospital at St. Lucia, were treated unsuccessfully with bark and opium, which I had been induced to try upon the authority of the  
authors

authors above alluded to. I attributed this want of success to the neglect of previous evacuation; for, upon inspecting the bodies, the intestines were found full of bilious *feces*. I profited from this, and was more successful in the other cases. It were to be wished that physicians could oftener bring themselves to confess their errors in practice, and their writings would be more instructive; for it is of consequence to know what we are to avoid as well as what we are to follow.

It has been mentioned that very good effects arise from the conjunction of an antimonial with an opiate; but, in this sort of fever, antimonials, and even most of the neutral salts, are hurtful after the first stage, and opiates may after this be given alone, or combined with camphor. With regard to the precise period of leaving off antimonials, it must be left to discretion, and the constitution of the patient is the best guide. There is so great a difference in patients in this respect, that all practical precepts should be qualified by a due discrimination of constitutions. In those diseases in which there is a specific remedy, such as the venereal



disease and the sea scurvy, little room is left for discrimination, but in those diseases of which the cure consists in a duly regulated treatment, absolute and dogmatical rules are so far from applying, that there are some cases of the same disease that require a treatment even opposite to what is in general most adviseable. This may be very aptly illustrated by the small pox, of which there are cases that ought to be treated very differently from the general method laid down by Sydenham, and in which vinous and aromatic cordials, as well as those of an opiate kind, are highly proper and necessary, both in the eruptive and secondary fever. And in the ship fever such is also the diversity of constitution, that I find in the medical journals of the Navy, which it is my official duty to examine, that the antiphlogistic treatment has sometimes proved successful when employed through the whole course of the disease. This diversity of the same disease in different individuals, seems to be one great cause of the difference of opinion among physicians on practical points; each party finding some countenance in experience for their general doctrine, do not make allowance for the varieties that exist in nature. If the patient is not very much sunk, and if there

there are bilious symptoms, or an obstinate dryness in the skin, a few grains of James's powder may be given with advantage even in an advanced period of the disease. If a hot and dry skin should at this period be the only troublesome symptom, it will be more safely and effectually removed by camphor combined with something opiate and the *Spiritus Mindereri*, which is the only neutral now admissible, than by antimonials, which at this time, would be in danger either of ruffling the patient by their operation on his stomach and bowels, or of weakening him too much either in this way, or by exciting profuse sweats. The same objection does not lie to contrayerva, which seems well adapted to this stage of the fever.

Evacuant medicines of every kind being then improper, clysters are the laxatives chiefly to be employed in case the state of the bowels require them. It is to be remarked, however, that the duodenum and small intestines are sometimes loaded with *feces*, though the natural evacuations may seem sufficiently copious, being supplied chiefly by the secretions of the great intestines. As the fever, and particularly the delirium is kept up by retained feces, it is of the utmost importance

to guard against this, and it may be discovered by the external feeling of fulness and tension. Where this is the case a laxative by the mouth is advisable.

But in this advanced stage of the fever, in which the most common symptoms are weakness, restlessness, tremors, and low delirium, no medicine was found so much to be trusted to as opium, which here acts as a cordial as well as an anodyne and antispasmodic. It may be given, in the camphorated julep, in the form of tincture, from five to ten drops every six or eight hours, or some of the officinal compounds, such as the theriaca or mithridate, may be employed with advantage. There is a variety of cases in which opium disagrees when given by itself, but with all the good effects expected from this medicine, when conjoined with aromatics, I have thought also, that, at this period, castor conjoined with opium seemed to improve its virtue. This was first suggested to me by Mr. Crudie, an ingenious German surgeon, whom I employed as an assistant at the hospital at St. Lucia; and since I have been physician to St. Thomas's hospital, I have found the most pleasing effects, in similar cases,



cases, from a composition used there, the principal ingredients of which are opium and castor. In other cases as well as low fevers, an opiate thus combined would procure sleep and ease, when other forms of it do not succeed, and would even produce disturbance. Opium, particularly in this form, seldom fails to raise a languid pulse, and makes it slower if it should be very quick. It seems to stimulate and invigorate the heart to perform more compleat and stronger contractions; and it is probably from its effect in making the pulse fuller, that it has been said by the old theorists to rarify the blood.

As the management of opium constitutes a considerable proportion of the whole art of physic; as the best things are most liable to abuse; as it is a medicine very powerful and precarious, with great diversity and even contrariety in its operation; and being the most capricious of any with regard to individual constitutions, it is of the utmost consequence to fix, if possible, some rules and principles with regard to the administration of it; and I hope it will not be considered as out of place here,

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to recapitulate and illustrate still farther what has been said on this subject.

The most remarkable sensible operation of opium on the system, is to increase heat and invigorate the circulation, particularly in the brain. When a dose of it is taken sufficient to destroy life, there is so strong a pulsation of the carotid arteries, as to be visible to the sight of a bye-stander at some distance. I have myself been a witness to this. A deficiency in the generation of heat, therefore, and a languor of the circulation, are some of the best criterions whereby to distinguish those cases and constitutions to which it is adapted; and the opposite circumstances best characterize those cases and constitutions in which it is prejudicial. There is a sufficient illustration of the first part of this position in the treatment of the fever in question, in which it proves one of the most excellent cordial and restorative medicines; and it is, I believe, conformable to the observation of every experienced practitioner, that wherever there is increased heat, or increased tone or action of the heart and arteries, or a tendency

tendency to these; in short wherever there is fizy blood or plethora, opiates are hurtful.

In cases where opiates are indicated by pain and restlessness, but when they seem forbidden by some degree of heat and arterial action, they are modified and corrected, as has been already mentioned, by combining them with saline medicines of the neutral kind, or with ipecacuanha or antimony.

There are other circumstances where opiates require correctives of a different and opposite kind, not only in this fever, but in their general employment. There are certain individuals whose constitutions cannot be reconciled to pure opium, though labouring under such morbid symptoms as are most commonly relieved by this medicine. In these, it either does not produce sleep, or sleep of a disturbed and unrefreshing kind, and followed by head-ach, nausea, want of appetite and depressed spirits, and confusion of ideas. These inconveniences are frequently obviated by combining it with aromatic substances, and in this case  
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a smaller dose also answers the intended purpose. The celebrated \* officinal compounds

\* There is but one of these retained in the present edition of the London Pharmacopœia, namely, that commonly known by the name of *philonium*, under the title of *confectio opiata*. This seems exceptionable, from the too great heat and acrimony of the spices it contains; and those that have been omitted, are exceptionable from the unnecessary multiplication of ingredients, and the too small proportion of opium, which renders the administration of them inconvenient in point of bulk. I am in the use of ordering, in private practice, a similar medicine with the milder aromatics, and I have found it answer all the abovementioned purposes, by meliorating the operation of opium. The aromatics I commonly order are, equal quantities of carraway, coriander, and cardamom seeds, cinnamon, nutmegs, and storax. These are compounded in the form of a confection, so as to constitute a fourth part of the whole, and with as much opium as to make one thirtieth of the whole. The strength of the spices may be adapted to the particular case under treatment. If coldness, or the want of vigour in the circulation, should render it necessary, it may be given with some powder or tincture of ginger, or even capsicum.

I have found the aromatic confection joined with laudanum a good substitute for these preparations; and this combination is improved by castor either in powder or tincture.

There are other circumstances to be attended to in the administration of opium, which are minute and perhaps inaccountable, but nevertheless fully ascertained by experience. It is found, for instance, that the preparation of  
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pounds containing this drug, owe their virtue and character to this combination; for they are found in innumerable instances to afford the utmost relief, when it would be hurtful in its pure state. It is not to be wondered, therefore, that they have maintained their reputation for ages. The effect of spices in modifying the operation of opiates, probably depends on that reciprocal influence of the brain and stomach so observable in other instances. A certain correspondent state of each seems necessary to the healthy functions of both, and of the whole system. But I avoid reasoning on this, as we are indebted for this fact, as well as most other valuable discoveries in practice, to pure experience, and not to physiological or pathological deduction.

But in the advanced state, and in the worst forms of this disease, wine is an indispensable cordial. This may be given either pure, or diluted with water for  
common

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it in wine, according to the old form of liquid laudanum, will answer in many cases much better than the tincture of it in spirits, according to the present form of it in the London Pharmacopœia; and the watery infusion of it, will in some cases answer better than either.



common drink, and sometimes to the quantity of a quart in twenty-four hours. The quantity may be regulated, by giving small quantities at small intervals, and observing from time to time, the effect upon the patient's heat, and the frequency of the pulse. In delicate people, such as we meet with in private practice, the quantity ought to be less, unless when the languor, coldness, and prostration of strength are very great, in which case, not only wine in large quantities, but ardent spirits and cordial confections may be used in considerable doses. I have seen cases in which this practice has been remarkably successful; but they are very rare, and much discretion is necessary in distinguishing them from ordinary cases.

In the most dangerous stages of this disease, when there is incessant delirium, unconscious discharge of urine and *feces*, and when nothing can be given by the mouth, either from the resistance or the inability of the patient to swallow, medicines and nourishment may with great advantage be administered by glyster. Bark and other medicines may be given in this manner, and  
opium,

opium, while it concurs with these in its medical virtue, serves at the same time to make them be retained. A case is related by Mr. Reilly of the Beaulieu frigate, of a man recovering under these circumstances, by introducing wine and opium in this manner\*.

There is this caution necessary with regard to the use of wine, that when the fever is gone off, and only extreme debility remains, the free use of it is not safe nor proper; for, in a weak and exhausted state, a person is more apt to be † heated and intoxicated

\* When there is an inability to swallow, either from weakness, delirium, or organic impediment, life may be supported for a great length of time by this method of introducing nourishment. I had an instance in my own family of life being not only preserved in this manner, but final recovery effected, when nothing had been swallowed for eleven days.

† Great nicety is required in most cases with regard to the times and doses of cordials; for it by no means follows that these should always be in proportion to the lowness and loss of strength. This is well illustrated by Mr. Hunter in his Lectures, where he explains the distinction between the *powers* of the body and its *actions*.

intoxicated by any fermented liquor, than in health, or even in the preternatural and disturbed state of actual disease, such as occurs  
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There must be a certain degree of strength to bear the excitement occasioned by stimulating and strengthening medicines or diet; for nothing is more pernicious, or even fatal, than that any part or function should make exertions beyond its strength; and there is the more danger in ill-timed remedies of this kind, as a state of weakness is generally a state of irritability.

I have found theories so unsatisfactory and fallacious, that I have not ventured to build any thing practical upon so slippery a foundation; and have therefore excluded them entirely from my text. But though they are in many instances pernicious, they are sometimes useful by suggesting remedies, and modifying and varying methods of cure which might not otherwise have been thought of, and which experience may afterwards justify. Mr. Hunter does not say in what these powers of life consist; but there are two principles in the animal œconomy to which theorists do not seem to have sufficiently attended. The one is, the power of generating heat, and maintaining a uniform temperature; the other is, that of resisting putrefaction; for the natural warmth and moisture of the living body are exactly what are most favourable to the putrefactive decomposition. If ever theoretical doctrines should attain sufficient perfection to admit of solid practical application, the first step in it, I apprehend, would be to enumerate all the powers and functions peculiar to life; for it is presum-  
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in this fever. In the advanced stages of this disease, serpentary may be used with advantage either alone and in substance, or conjoined in decoction with bark. Vola-

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able, that to each of these there will be a corresponding state of disease, or deviation from health. Now the reality of the powers I have mentioned cannot be questioned, nor can it be denied that they are some of the most important, nay, essential and constituent characters of life; and it may be rationally presumed, that some of the most frequent and dangerous morbid conditions of the body will consist in a disorder of these powers. Does not observation concur with this reasoning, in declaring, that in fevers which constitute so great a proportion of the whole of diseases, and have so great a share in the mortality of the human species, derive their principal phenomena and their fatality from an excess or defect of these two principles? Are not rigors owing to a defect of the generating power of heat; and is not the increased heat from, which fevers, in all languages, derive their name, owing to an over exertion of the same power, which thereby wears itself out, and expends life; and is not the cold and torpid state so common in the advanced stage of the fever now treated of, owing to a want of action in this power; and do not these opposite states constitute the two cases alluded to by Mr. Hunter? The same reasoning will apply to what may be called the antiseptic power of life, with this difference, that its deviation seems to be only on the side of defect. This is most remarkable in the malignant fevers of hot climates, as will be seen in the description of the yellow fever.



tile salts may very properly be employed in the like circumstances. The objection made to these salts in this sort of fever, that they dissolve the blood, seems founded on a fanciful theory.

After the disease is removed, a long state of weakness is apt to succeed, especially in a warm climate. The most proper remedies, then, are bitters, such as decoctions of Peruvian bark, infusions of quassia, gentian, or columbo root. These answer better than the bark in substance, which is now apt to nauseate and load the stomach, and the patient is apt to take an aversion to this and whatever else he may have taken in a state of sickness. The best strengthening medicines are such as comfort the stomach and create appetite; and we may mention Huxham's tincture of bark, in small doses, and a moderate use of wine, as the most proper for these purposes. Where colliquative sweats take place, the vitriolic acid is serviceable, and with this intention I have joined it, with evident advantage, to the evening anodyne, which, without such a corrector, tends rather to aggravate this symptom. As it is necessary to procure sleep as well as appetite, in order to recruit

cruit strength, the prudent use of opiates at bedtime, may be considered as one of the most effectual cordial and strengthening medicines in this convalescent state, especially if combined with volatile spirits or aromatics.

It sometimes happens that heat, and a quickness of pulse, remain in the convalescent state without any visible cause. This sometimes proceeds from *fordes* lodged in the bowels, and the best remedy in this case is a cathartic containing calomel. I have sometimes been so confident of this being the case; that when the first, or even the second or third dose has failed to produce the intended effect, I have continued to repeat it, till a quantity of *scybala*, bile, or slime being brought away, the symptoms above described disappeared.

But in general the management of the sick at this time, depends as much on diet as medicine. Nothing has been said concerning this in the acute state of fever, because little nourishment is then necessary. In that state there is a loathing of all food, and the powers of digestion and assimilation seem to be suspended, so that alimentary

C c 3

substances,

substances, unless sparingly administered, become not only an useless load, but offensive and hurtful, by turning acid or putrid. It is likewise evident from fact, as well as reason, that nature, in this situation, requires but little sustenance; for we frequently see people labouring under fevers who do well and recover, though they have been without nourishment for a length of time, in which the like abstinence in a state of health would have proved fatal. The friends and attendants of the sick, from a prejudice not unnatural, but not considering the difference between health and that state of derangement which takes place in fever, are for ever wishing to supply the patient with nourishment, and every physician meets with trouble in counteracting this officiousness. Nevertheless, when the fever draws out to a considerable length, and the principal symptom is that state of weakness which, in low fevers, runs insensibly into that of convalescence, then it is necessary to pay the utmost attention to nourishment, and nothing tends more to insure and hasten recovery than the assiduous administration of light and nourishing food, the same cautions being observed which have just

just been mentioned with regard to cordials. One of the greatest hardships of a sea life is the want of those articles of diet that are suitable to a recovering state, and many lives are lost from this circumstance, after the force of the disease has been subdued\*.

With regard to the peculiar form, before described †, which this fever assumes a few months after ships have been in a hot climate, we found camphor, volatile salts, and serpentary, the best remedies. As there was a remarkable coldness of the skin, I was induced in one case to try the hot bath, and with good effect, from which it seems probable that a short stay in a bath, of a heat from 96° to 100°, so as to have its warming and stimulating without its relaxing effects, would answer well in fevers of this kind.

\* See a method proposed for obviating this, page 280.

† Page 351 et seq.



## 2. Of the BILIOUS REMITTING FEVER.

THIS is peculiar to tropical climates, and arises in the same situations in which intermitting fevers arise in temperate and cold climates. It seldom arises at sea, unless where there has been previous exposure on shore, of which some examples have been mentioned in the first part of this work. It may generally be traced to the air of woods or marshes; and in our fleet hardly any men were attacked with it but those who were employed in the duties of wooding and watering.

The most distinguishing symptom is a copious secretion of bile which attends it. Its course, in general, is shorter than that of the fever before described; and though the symptoms are more violent, they are not so equal and steady, owing to the tendency there is to remission. The symptoms are particularly violent at the beginning, in so much that some of the men, after being exposed

posed upon duty to the heat of the sun and the air of marshes and woods, would become frantic, being seized almost instantaneously with *delirium* resembling madness. This fever, when it arises merely from the effluvia of woods and marshes, has a natural tendency to remit; nay, some fevers at St. Lucia, proceeding from this cause, were of the pure intermitting form from the beginning. But in many of those that arose at Jamaica little or no remission was to be perceived; and it was distinguished from the ship fever by the bilious vomits and stools, more violent delirium, and head-ach, and by being attended with less debility. The greater tendency to the continued form at this time was probably owing to this circumstance, that the men who were exposed to the land air in wooding and watering, were then exposed also to such causes as naturally produce continued fevers, such as infection, the foul air of the French prizes, intemperance, and hard labour. There was in some cases a yellowness of the eye, and even of the whole skin, but without the other symptoms that characterise the yellow fever, properly so called, while others had every symptom of it.

In

In cases that proved fatal, the symptoms, for some time before death, resembled very much those of the fever before described at the same stage, There was either *coma* or constant delirium, great seeming anguish, the mouth and tongue very dry, or with only a little ropy slime, a black crust on the teeth, picking of the bed clothes, and involuntary discharges of urine and fœces.

#### TREATMENT of the BILIOUS REMITTING FEVER.

THE measures proper to be taken in the beginning of all fevers are pretty nearly the same. There is little difference in the first treatment of this from that of the ship fever, except that blood letting is here more frequently proper, and that a more free evacuation of the bowels is necessary on account of the more copious secretion of bile.

In full and athletic habits the disease very commonly begins with pains in the limbs, back, and head, with a strong throbbing pulse; in which case it is proper first of all to let blood at the arm. This is also highly proper

proper and necessary in those cases mentioned above, in which the patient becomes suddenly frantic. But though the cases requiring blood-letting are more frequent in this sort of fever than that already treated of, yet great caution and nice discernment are necessary with regard to it, in all cases, in a hot climate. As fevers in such a climate run their course faster, the symptoms succeeding each other in a more close and hurried manner, greater expedition, as well as discernment, are required in timing the different remedies than what are necessary in a cold climate. Blood letting unseasonably and injudiciously employed either endangers life, or has a very remarkable effect in protracting recovery, by the irrecoverable weakness it induces.

With regard to the evacuation by the bowels, it has already been mentioned in another part of the work, when on the subject of prevention, that, before the fever comes on, there is a languor and general feeling of indisposition, and that then an emetic and a purgative, followed by some doses of the bark, were the most likely means of preventing the attack of the disease.



ease. If the fever has properly begun, which is announced by a *rigor* taking place, then no time is to be lost in procuring evacuation; and, after blood letting, if the symptoms should require it, the best medicine is tartar emetic, which, if given in small divided doses, at short intervals, will most probably evacuate the whole intestines by vomiting and purging, and may even prove sudorific. But it will nevertheless be proper to administer a purgative medicine soon after; and what we found to operate with most ease, expedition, and effect, was, a solution of purging salts and manna, either in an infusion of senna, or in common water, or barley water, with some tincture of senna added to it.

The next step towards procuring a remission is, to open the pores of the skin, which is best done by small doses of James's powder or emetic tartar, assisted by saline draughts, which will be given with most advantage in the act of effervescence, made either with the fixt or volatile alkali, together with plentiful warm dilution. I once, by way of comparison, tried the two antimonial preparations above mentioned in a number of men ill of this fever, who were  
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sent to the hospital at one time, giving emetic tartar to one half, and James's powder to the other, and their effects were so similar, that I could perceive no reason for preferring the one to the other. Antimonial medicines seem better adapted to this than any other sort of fever, except the rheumatick, and may be more freely given in it.

These are the most likely means of bringing about a remission; and if this is effected, nothing remains to be done but to throw in as much Peruvian bark as the stomach will bear.

But whether from a fresh accumulation of bile, or some other circumstance, it may happen that the fever is kept up; and in this case there is commonly a sense of weight or uneasiness about the *hypocondria*, which seems to indicate that the redundant bile is in the gall bladder or ducts of the liver. In this case a repetition of evacuants is necessary, and calomel will be found to answer remarkably well as a purgative, its stimulus being so extensive as to loosen and bring away bile when the saline purgatives,  
such

such as that above mentioned, had failed of having that effect. I have known these to pass through the intestines without relieving the uneasy sensation about the stomach, as calomel is found to do; and it will be still more effectual for this purpose, if given alone in a dose, from five to ten grains, and followed some hours afterwards by some other purgative. I was led to entertain a favourable opinion of the effect of calomel in West India fevers, from having given it in large quantities to a flag officer, who was naturally of an obstinate temper, and doubly so when under the influence of delirium, inso-much that no purgative, and little medicine of any kind, could be introduced except calomel, which was conveniently administered from its small bulk and little taste. A salivation was unintentionally brought on and the patient recovered. Jalap has been found to be an useful auxiliary to calomel; and it is probable that the influence of purgatives of this kind is not confined to the intestines, and other abdominal viscera, but that they excite absorption of the redundant serum, effused bile, and other acrid or depraved humours, through the whole body, and

and eliminate them by the intestines as the hydragogue purges do in dropfy.

After fufficient purging, antimonial medicines are again to be had recourse to; and thefe, as well as purgative and neutral medicines, are fafe and ufeful in a more advanced ftage of this fever than they are in the ship fever; for the ftrength is not fo apt to fink, and the ftate of the bowels requires them more. Antimonials, however, are to be ufed fparingly and cautiously as the fever advances; for I have known them, when given only a few days after the firft attack, to have the effect, in fome constitutions, of making the ftomach fwell, and of producing a general fenfe of heat and uneafinefs.

After the evacuation of the bowels, the anodyne diaphoretic may be very feafonably given in the manner formerly mentioned; for it will not only tend to foother and procure fleep after the commotion that has been excited, but by its gentle fudorific effect will affift in completing the remiffion.

The principal point of management in the fevers of this climate is, to throw in the Peruvian bark in proper feafon. I formerly



merly took occasion to differ in opinion from those who alledge that little or no discrimination is necessary with regard to the circumstances in which bark is proper in continued fevers. I made fair and unprejudiced trials of this, but always found that some sort of remission, especially towards the beginning of the disease, was necessary, in order to make the use of this medicine safe and proper. The greatest vigilance is indeed required that the administration of it be not omitted when it is at all adviseable, as the course of fevers is very quick and critical in this climate. I have watched many nights with some friends in whose health I was particularly interested, to catch the hour when it might be allowable to give it; and where the propriety of it was somewhat ambiguous, it was usual to qualify it either by conjoining some antimonial or neutral salt with the first doses, or by giving them alternately with it, as has been formerly mentioned.

Under the use of these means, the favourable symptoms are, a warm moist skin, a strong steady pulse, with the pulsations under a hundred in a minute, a natural countenance

tenance, and being free from delirium. But if the fever should not yield during the first week, but takes an unfavourable turn, the pulse then becomes more small and frequent, there is a general agitation, the tongue is tremulous when put out, there is great thirst and delirium, with a dry and hot skin. In these circumstances, besides the continuation of the antimonials in smaller doses, with the anodyne diaphoretic, and the occasional use of purgatives, blisters become proper; and we found also camphor combined with nitre an excellent medicine at this period of the disease.

Should the patient survive to the end of the second week, the treatment then comes to resemble more and more that of the infectious fever already described. Bark may be given, though there should be no proper remission, and cordials and opiates may be more freely used. Attention to the state of the bowels will still be necessary, since repeated accumulations of bile are apt to occur even in the most advanced stage, and gentle emetics of ipecacuanha, as well as laxatives, may be necessary. For the same reason also, greater caution is requisite in the

use of pure opiates than in the infectious ship fever before treated of. In order to keep the bowels soluble, it was a very usual practice, and found very useful, to conjoin a few grains of rhubarb with each dose of the bark.

### 3. DESCRIPTION of the YELLOW FEVER.

THE fever last treated of may be said to be peculiar to a hot climate; but the hot seasons of temperate climates produce something resembling it. That now to be described never originates, so far as I know, except under the influence of tropical heats. It has indeed been known to prevail, chiefly during the months of August and September, in the towns of North America, particularly at \* Charlestown in South

\* The same fever broke out in Philadelphia in 1762, again in 1793, and this present year 1798, at the season mentioned above. It has also visited New York in 1795, and in the present year, but with less malignancy than at Philadelphia. It has also shewn itself this autumn, though in a still less degree, at Boston, and in the towns still further north on the coast of New England, where it

South Carolina, where, according to the account of Dr. Lining, who has given an accurate \* description of it, it prevailed four times in the course of twenty-eight years. But he is clearly of opinion that it arose from infection imported from the West Indies; and this opinion he builds upon grounds which seem unexceptionable.

It differs from the remittent fever with regard to its causes, as well as symptoms, for though it may arise in the same circumstances, the air of woods and marshes is not necessary for its production. All the facts relating to the origin of this disease, as related in the first part of this work, being laid together, and fully considered, it appears that it may arise among new arrived Europeans, from fatigue in the sun or intemperance; but that the most usual cause

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it had been till now unknown. It has been confined to the sea-port towns of that continent; and for this, as well as other reasons, it seems to have owed its origin there to infection imported from the West Indies.

\* See the Physical and Literary Essays of Edinburgh, vol. II.



of its becoming epidemic is the influence of the \* infection of the ship fever, or the putrid exhalations, such as those from the holds of the French prizes †, and that being so produced it continues itself by infection.

This complaint is so peculiar to strangers, that the French call it *fièvre de matelot*, and I conversed with some professional men in the West Indies, whose practice lay among the natives and negroes at a distance from sea-port towns, who informed me they had never seen it.

It has been said that it never attacks either the female sex or blacks. This is

\* See pages 129. 147. and 350. This observation concerning what may be called the typhous infection, has been fully confirmed this war, 1798; for it has been remarked that the troops who made their passage in transports which were sickly and ill aired, were the most liable to the yellow fever after they disembarked, though they might be then in good health. This might be either in consequence of some infection adhering to their clothes, or from some obscure change brought about by its influence on their constitution, predisposing them to be affected by the climate.

† See pages 88 and 113.

in general, though not absolutely true, for I knew a black woman who acted as nurse to some men ill of this disease, at the hospital at Barbadoes, who died with every symptom of it.

There is some variety in the forms of this fever, according to the peculiar constitutions of different persons, and other circumstances ; but in the following description, the appearances which most frequently occur will be enumerated.

In general it begins with short alternate chills and flushes of heat, seldom with those rigors which constitute the regular cold fit, and with which most other fevers begin; these are immediately succeeded by violent headache, pain in the back, universal debility, sickness, and great anguish, proceeding chiefly from great pain and distress at the stomach. There is commonly at the beginning a redundancy of bile, which is thrown off by vomiting, either natural, or excited by an emetic. Those men who were taken ill with this fever in the Alcide, in the end of the year 1781, had a sore  
D d 3 throat

throat in the beginning; but this was not a common symptom.

In the course of this disease there is not much bile in the intestines, and least of all in those cases that are most violent, and prove the soonest fatal. In those whom I inspected after death, there was but little bile even in the gall bladder. Whether this is owing to a scanty secretion or an excess of absorption, I will not pretend to determine, but I should rather think it owing to the latter cause. In cases that are more protracted and less desperate, there are frequent accumulations of it, as appears by the vomits and stools.

In a few hours a yellow colour is perceived in the face, soon after in the eye, and it extends more or less over the whole skin. This is a symptom so striking and constant, that it gives name to the disease. Some instances occurred in which this symptom was contagious, without being attended with the other characters which distinguish this disease. It was observed in men belonging to  
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the \* Royal Oak, without any symptom of malignity, though evidently infectious; and at the hospital it was known to spread from men affected with the fever in its worst form, to others in the adjoining beds, without being accompanied with any malignant symptom.

But though the yellowness is almost a constant symptom, there is another which characterizes it equally, and may be considered equally as a diagnostic of this disease. This is the sense of burning heat at the stomach, which is in proportion to its violence and danger, and becomes unspeakable torture, as the unhappy sufferers express it. The propriety of fixing upon this as a distinctive character of the disease, is confirmed by the inspection of the dead body, where the stomach is almost always † found in some stage of inflammation, from a slight suffusion of its inner surface to a state of gangrene. If it were not for the

\* See page 148.

† The only exception I find to this in authors, is an essay of Dr. Hume, who says, that in some subjects no inflammation of the stomach was found, and yet in these cases there was excessive vomiting.



great pain of the stomach, and the extreme tenderness to the touch externally, the appearance found upon dissection might be considered as a mere suffusion from the general *error loci* of the red globules. That it is a real inflammation, and induced by a poison, seems further confirmed by a passage in Brown's Gazette, published at Philadelphia, where the state of the stomach\* is

\* This affection of the stomach seems to be, with regard to this fever, what the sore throat is with regard to the scarlet fever; and may not the local inflammation in the one case as well as the other, be owing to the peculiar action of a morbid poison on the part? It has already been remarked (page 270) that these poisons prove a specific stimulus to the respective organs which they affect. The greater part of those in a volatile form affect the lungs, or different parts of the passages to them; but those which are the causes of fevers intermittent and continued, are probably swallowed with the saliva, and affect the stomach either by exciting an immediate disease in it, as in this case, or by disturbing the system in general by sympathy, as in the intermittent. There is a similar specific action in the morbid poison of dysentery; and I have lately seen in manuscript, an account of an epidemic inflammation of the colon, in the East Indies a few years ago, proceeding most probably from a like cause.

That principle of the animal œconomy whereby the several organs are specifically acted upon by their native fluids, by morbid poisons, and medicines, seems to offer a wide field for medical reasoning.

described

described as similar to that which is induced by acrid poisons, such as arsenic.

There is something very peculiar in the countenances of those who are seized with this disease, discernible from the beginning by those who are accustomed to see it. This appearance consists in a yellow or dingy flushing or fulness of the face and neck, particularly about the parotid glands, where the yellow colour of the skin is commonly first perceived. There is also in the eye, and muscles of the countenance, a remarkable expression of dejection and distress.

One of the most constant and distressing symptoms of this fever is an obstinate unremitting and painful *pervigilium*, which is the more agonizing, as the patient is extremely desirous of sleep. It is seldom that even a *delirium* comes to his relief to make him forget himself for a moment; but he continues broad awake, night and day, with his reason and senses sound, and in a state of the most uneasy agitation.

But

But in all the stages of this disease, it is the affection of the stomach that affords the most distinguishing and important symptoms. As it advances, an unconquerable irritability of this organ comes on. Whatever is swallowed, whether solid or fluid, of whatever quantity or quality, is immediately rejected by vomiting. An almost incessant retching takes place, even without any extraneous irritation, which commonly on the third day ends in what is called the *black vomit*, the most hopeless of all the symptoms attending it, and the fatal termination of it is commonly on this day.

Bleeding at the nose is a frequent symptom in the more advanced stages; and some authors relate that blood also escapes sometimes from the pores of the skin, which I never saw, but can readily believe. The red globules seem to enter the colourless order of vessels every where. It is farther in proof of this, that when any part of the skin is ever so little pressed upon, a damask red colour remains for some time, the smaller vessels readily admitting the red globules. This happens more probably from a relaxation

tion of the vessels, than from a dissolved state of the blood. From the same cause it is apt to escape from the vessels, particularly from the surface of the alimentary canal, and the membrane of the nose. I have seen death in more than one case brought on suddenly by a profuse bleeding from the intestines; and this has probably in most cases more or less share in the fatal issue. The black matter that is vomited, and the black colour of the *fæces* and urine, in the last and hopeless state of this disease, seem to be owing to this propensity to hæmorrhage in the internal surfaces.

The yellow colour of the skin seems to be more owing to this *error loci* of the globular part of the blood, than to the over absorption of bile. This colour does not appear first in the eye, as in the jaundice. It may indeed be produced in this manner in the skin, without any suspicion of the presence of bile. This is exemplified in the case of chlorotic women, and other cases of chronic weakness. We have also a proof of it in the *ecchymosis*, which follows upon an external contusion. In this case the red part of the blood is mechanically forced  
either



either into the smaller order of vessels, or into the cellular membrane, which occasions first a livid appearance, and in the course of the recovery the same parts become yellow, probably in consequence of the greater part of it being removed by absorption or otherwise; for Sir Isaac Newton observes, that blood reduced to thin *laminæ* assumes a yellow colour\*.

With regard to the skin, it is at the first extremely hot and dry, but the external heat soon becomes very little different from the standard of health, and the skin feels soft and moist. There sometimes happens an eruption of small pustules, with white heads, on the trunk of the body, which is a favourable sign; and I have seen a head-ach disappear upon this breaking out.

\* Optic. B. I. Part 2. Prop. 10. It is observed by Dr. Rush, that in some subjects the yellow colour did not come on till a few minutes after death; which seems favourable to the opinion of its arising from something in the mass of blood, and not from bile. And as the yellow colour first shews itself about the neck, and sometimes in broad spots on the trunk of the body, it is hardly conceivable that such partial affections can be owing to an effusion of bile, which would necessarily act equally and generally.

The

The pulse is hard and frequent at the beginning, but after the hurry of the first attack it becomes very moderate in point of strength and frequency, so as to prove no index of danger. It is then from eighty to a hundred pulsations in a minute, and regular. A moderate state of the pulse is usual in inflammation of the stomach or bowels from whatever cause it may proceed.

In the advanced stage of the disease, the head-ach and delirium also abate. I have seen cases in which the senses were not affected from beginning to end; and I never observed that violent and incessant delirium which usually attend the dangerous state of other fevers. It is in this respect, and in the state of the skin and pulse, in which it chiefly differs from the fever last described.

The state of the *fauces* is also different from that of most other fevers, for there is commonly no excessive thirst. The tongue is somewhat white and foul, but I do not remember to have seen it black and dry.

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A want of action in the bowels, and an insensibility to purgative medicines, are common symptoms, and indicate great danger. One of the most unfavourable symptoms is when the *feces* are like white clay, as I have seen in some cases that run out to the length of a week before they proved fatal. A bilious diarrhœa spontaneously coming on, is a very favourable symptom.

In unpromising cases the urine is scanty, and in the last stage of life it becomes of a very dark colour, as was mentioned before. A plentiful secretion of urine is a very favourable circumstance, and seems to be one of nature's methods of curing the disease; and such cases are observed to terminate well. I remember one case in particular, in which several quarts were discharged daily for several days together, and it was of a very dark saffron colour, but looked green where the surface was in contact with the side of the pot. I inspissated a small quantity of it, and found a large residuum, which was very deliquescent, and seemed to be all saline. In a hot climate the urine

does not shew that separation and deposition which denote the crisis of fevers in cold climates, and this is perhaps owing to there being less mucilage and more alkali in the former, on account of the more putrescent state of the fluids. Upon adding a little vinegar to the urine in the case above mentioned, it became turbid like the critical urine of the fevers of Europe.

At the approach of death, cold clammy sweats come on; the pulse continues regular and of a certain degree of strength, but grows gradually slower. I have counted it at forty pulsations in a minute. The patient is frequently sensible to the last moment; nor does the countenance always sink into what is called the *Hippocratic* appearance. In other cases I have seen, at this time, *coma*, and not unfrequently convulsions. Broad livid spots sometimes also appear on the skin. Extreme muscular debility, a great difficulty of deglutition, and a dimness of the eye-sight, are likewise common symptoms in the last scene. The striking difference between the symptoms at the fatal period of this fever, from what they are in other fevers, seems to depend on the cause  
of



of death here consisting in a local affection of a vital heat.

The different stages which lead to dissolution following each other thus rapidly, there is not that gradual failure of the powers of nature that usually give warning of approaching death; but the springs of life run down, as it were, at once, the wretched sufferer expires, and is happily deliver'd from the most extreme misery of which human nature is susceptible.

Such is the general train of symptoms in this fever, as they occurred to my observation; but great varieties occur both in the symptoms and duration, so great indeed, that it is hardly recognisable for the same disease \*. I shall give specimens of such anomalous

\* The yellow fever which broke out in the West Indies in the year 1792, supposed to originate in the island of Grenada from contagion imported from the island of Boullam on the coast of Africa, and which made such deplorable havock in our fleets and armies, during the war which took place the following year, differs in some particulars from that which has just been described. The most remarkable points of difference were, that the yellow colour was not so constant; there was an exquisite pain

malous cases in two that occurred at Port Royal on board of the Canada, in July, 1782.

A lieutenant

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pain of the eyes, which were said, as it were, to swim in blood. A dilatation of the pupils was also a common symptom, and a more severe affection of the head in general in point of delirium, *coma*, and head-ach. Water was found in the brain upon inspection. *Dr. Chisholm's Essay on the Malignant Fever*, and *Journals of Navy Surgeons*. The same difference with regard to the affections of the head, was observable in this fever as it has lately shown itself in North America. This fever differs also from that of the West Indies, both as I have described it, and as it has lately appeared, in proving fatal at a later period. The cases of greatest violence and danger proved fatal in the West Indies, on the third or fourth day, but in America, on the fifth or sixth. Two cases of morbid dissection made at Boston, in New England, in the beginning of September 1798, have just come to my hand, and as they throw some interesting light on the nature of this disease as diversified by climate, I shall here mention the outlines of them. The subject of the first died on the sixth day from seizure, and as no medical means were employed till the first stage of the illness was nearly over, the appearances may be considered as the natural effects of the disease. Not only the stomach itself was found greatly inflamed, but all the intestines more or less so, as well as the liver: also the peritonæum on the lower surface of the diaphragm, and the pleura in its upper surface. The air vessels of the lungs were full of blood, and several ounces of firmly

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coagulated

A lieutenant of that ship had been subject, for four days, to fits of retching, without any bilious discharge or pain in the stomach; and, except a white tongue, he had no symptom of fever in that time, nor any thing to prevent him from doing his duty.

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coagulated blood were found in the cavity of the thorax. There were no marks of suppuration any where, nor any putrid fœtor, nor any unusual tendency to putrefaction in the body. The gall ducts were found impervious, and yet the black vomit had preceded death; which seems to prove, that the stomach itself is the source of the black matter. I suspect, that the black matter found by some authors in the gall bladder, is also effused blood, a general tendency to hæmorrhage in all the internal surfaces, being one of the most remarkable characters of this fever. The other subject died on the twelfth day. There were here evident vestiges of inflammation in the brain, lungs, and liver. The stomach was nearly in its natural state, except that the villous coat was covered with a black matter, though there had been no black vomiting. The duodenum and the other small intestines were inflamed, as was the inner surface of the urinary bladder, which was very much contracted, and had thrown out blood into its cavity. The inflammatory affection in both these cases is more prominent than in the West Indies. Though this is most probably owing to the climate being more northerly, yet it affords an additional proof of its general inflammatory nature, and a presumption in favour of early and copious blood-letting.

ON

On the fourth day, when I first saw him, he began to complain of a fixed pain in the pit of his stomach, which was not very violent, and about the same time a yellowness began to appear on the white of the eye. He took a laxative medicine, which had the desired effect, and some volatile spirits, with some drops of thebaic tincture in simple mint water, for the pain in his stomach. He had a good night. Next day the complaint of the stomach was better; but there was great muscular debility. He had several natural stools; and as there seemed little indication but debility, he took nothing that day except an infusion of some bitters and aromatics in wine. As he did not want for appetite, he eat some broth and chicken; and nothing to give any alarm happening this day, except a short qualm, in which he was faint, with a sense of cold, feeling to himself, as he said, as if he should have expired. In the afternoon he began to have black-coloured stools, which was the first symptom that clearly betrayed the nature of the disease. He was then ordered as much Peruvian bark as he could take with red wine, and these his stomach bore. Decoction of bark was also given



him in clysters. He had a strong voice, and was quite sensible, but grew weaker and weaker with frequent returns of the qualms, and he expired that evening before ten o'clock. The copious black stools betrayed an internal hemorrhage, which probably had the principal share in his sudden dissolution.

I have not the least hesitation in ranking this case with the fevers last described, though so many of the usual symptoms were wanting. This gentleman, though of a lively, active disposition, was of a slender make, and of a dingy, doughy complexion.

The sudden fatality of this case, and the peculiar mode of it, seemed to be owing to natural debility, and the propensity to internal hemorrhage, to which the threatenings of syncope, and at last the fatal event, seemed more immediately to be owing.

A few days after this gentleman's death, another officer of the same ship was taken ill with the same sort of fever, and it was also  
attended

attended with several unusual symptoms. Neither his skin nor eyes were yellow; the skin was hot and dry throughout the disease, and during the three first days there was a diarrhœa, which was neither bilious, putrid, nor mucous, but consisted in watery stools. There were no gripes, nor any local pains whatever; but I never remember to have seen more suffering from that general anguish, particularly about the stomach, which attends this sort of fever. On the third night he began to vomit and purge blood, which soon terminated in that dark-coloured discharge which is a symptom so characteristic and fatal in this disease. He continued sensible till within eight hours of his death, which happened on the fourth night. The pulse was full and pretty strong during the whole course of the disease; but there was all along great debility and frequent sighing, symptoms that ought always to create alarm.

I have but one other circumstance to mention regarding an individual. I attended a marine officer at St. Eustatius in 1781, who had the yellow fever in its most violent form. Upon my entering his apart-

ment one day in the latter stage of it, he fell into convulsions, which lasted, with little interruption, for some hours. I found they came on and went off with an eclipse of the sun: but whether this symptom had any connexion with this phenomenon; or if it was merely a fortuitous coincidence, I am unable to determine. I never had any other reason to suspect that this disease was affected by celestial influence.

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### TREATMENT of the YELLOW FEVER.

I FEEL this as the most painful and discouraging part of this work, the yellow fever being one of the most fatal diseases to which the human body is subject, and one in which human art is the most unavailing.

It seems hardly to admit of a doubt that there are particular instances of disease, in their own nature, *determinedly fatal*, that is, in which the animal functions are from the beginning so deranged, that there are no possible means in nature capable of controlling

ling that series of morbid motions which lead to dissolution. Of this kind appear to be the greatest number of cases of the plague, many of the malignant small-pox, and some of fevers, particularly of that kind now under consideration. It is extremely difficult to ascertain such cases from observation; and it may be said that the opinion of the existence of them is favourable to ignorance and indolence. But, on the other hand, it may be questioned if more harm is not likely to arise in medicine by being too sanguine and officious, than by a diffidence of art and trusting to the powers of unassisted nature. Were we thoroughly acquainted with the animal œconomy, we should perceive *a priori* in what instances the seeds of disease would either operate so as necessarily to terminate in death, or when they were within the command of art. But we can derive little or no information from this source, on account of our great ignorance of the secret operations of the living body; so that the only grounds of judging are our observation and experience concerning the usual event of disease, and the effects of remedies. Though these are circumstances attended with great uncertainty and ambi-



guity, yet I believe it will be admitted as the opinion of the most chaste and experienced observers, that there do really exist diseases whose course cannot be diverted by any means that can be employed. This opinion, I have said, is, in one view, extremely discouraging; yet, to the mind of a feeling and conscientious practitioner, who must often find his best endeavours baffled in many diseases as well as this, and who might be apt to look back and accuse himself of some fault or omission, it affords this satisfaction to his reflections, that the want of success may have been owing to something in the nature of the disease, and not to his want of skill and attention. But though the fatality of this disease is discouraging, let us not despond, but rather redouble our diligence in observing what assistance and relief nature may admit of.

In delivering the treatment of this disease, I shall consider it as my duty not only to give an account of my own practice, but of such remedies and methods, as have been recommended and brought into use, since the last edition of this work.

It

It is proper in this, as in every other fever of this climate, to begin the cure by cleansing the first passages. This does not produce the same relief here, as in the common remittent fever, because there is a less quantity of bile present in the intestines, and therefore less oppression from the collection of it. I commonly employed the purging salts for this purpose, but most of the later practitioners are agreed that calomel may be employed with superior advantage in this stage of the disease. With this intention it is given from ten to fifteen grains. Ten grains of it with as much jalap was a medicine employed with uncommon success in the malignant fever of Philadelphia according to the testimony of Dr. Rush.

Glysters of purging salts and castor oil have been found very useful in cleansing the bowels, more especially when purgatives by the mouth, have been obstinately rejected.

As the symptoms of this disease, are very violent, and its progress very rapid, and as the success of the means to be employed, will depend on the earliness of the administration,

no

no time is to be lost in applying the most efficacious remedies. It is presumable that no remedies but such as produce some powerful effect, and a thorough change in the morbid condition of the body at an early period of the disease, can be of real avail in saving life. Though therefore purgative medicines have been first mentioned, it is not necessary to wait for their operation before employing other means of cure. This remark applies particularly to blood-letting; the success which depends peculiarly on the earliness of its administration. There is generally a \* buff on the blood in the beginning of the disease, but in its second stage, it is mentioned by a † French author, that it

\* There is a difference in the appearance of the blood when fizy, perhaps not sufficiently insisted on by practical writers; for though there should even be a very thick buff, yet, if the surface is flat, and the crassamentum tender, no great inflammation is indicated, in comparison of that state of the blood wherein the surface is cupped, the crassamentum contracted so as to afford the appearance of a large portion of serum, and where it feels firm and tenacious, though perhaps but thinly covered with buff. This is a distinction well worth attending to in practice; for it is in these last circumstances that blood-letting gives most relief, and where the patient will bear the repetition of it with most advantage.

† Monsieur Desportes who wrote a treatise on the diseases of St. Domingo.

hardly

hardly coagulates or separates. This indicates the propriety of confining this remedy to the first period, and perhaps this should not much exceed twelve hours. It is further presumable, from reason, that this evacuation is well adapted to this fever, from the most important affection being an inflammation of a vital part. But as this inflammation has a tendency to gangrene, and as extreme debility rapidly comes on, it is evident that blood-letting ought to be practised with discrimination, and limitation. The great and laudable anxiety about the means of combating this dreadful enemy, has, among other new and bold methods of cure, led to the practice of very copious and repeated venesection. Nor is it to be wondered that the sanguine expectations of practitioners, in scenes so embarrassing and affecting, where the emotions of the mind are too strong for the cool exercise of judgment, should have led them to over-rate the success of certain favourite methods of cure, and to carry them to an inordinate length. It is only in this way, and partly from the difference of individual constitutions, that the great diversity and even contrariety of the reports of medical men concerning



cerning this and other remedies, can be accounted for, as it is hardly conceivable that there could be in any one a deliberate intention of deceiving.

The subjects to whom blood-letting is most likely to be beneficial, are those of a robust and plethoric constitution newly arrived from Europe. As my practice lay chiefly among seamen, accustomed to the climate, and living chiefly on salt provisions, I had little opportunity of seeing the effects of this method of cure. I am still of opinion, that in the majority of cases occurring among seamen, it will not be advisable, and that it will seldom be proper beyond the first twelve hours. The testimonies in favour of its being performed copiously and repeatedly in the \* army in the West Indies, and among the inhabitants of † Philadelphia, are so strong as to afford satisfactory evidence

\* See Treatise on the fevers of Jamaica, by Robert Jackson, M. D. London, 1791, and an Enquiry into the nature and causes of the great mortality among the troops at St. Domingo, by Hector Maclean, M. D. London, 1797.

† See an Account of the bilious remitting yellow fever, as it appeared in the city of Philadelphia, in the year 1793, by Benjamin Rush, M. D.

of its utility in many cases. In the opinion of Dr. Clarke of Dominica \*, who has written one of the most judicious and temperate treatises on this disease, and according to the report of some of the surgeons of the navy of the best sense and understanding, this evacuation requires great restriction, and discrimination, with regard to the cases to which it is applicable, and the extent to which it ought to be carried †.

\* See a Treatise on the yellow fever, as it appeared in the Island of Dominica, in the years 1793—4—5—6.

† Considering that the principal danger of this disease, consists in a local inflammation, it is rather surprising that local blood-letting should not have occurred to myself or others as a likely means of relief. It is one of the advantages of local bleeding, that the same effect may be produced at less expence of blood, and it must be of consequence to save blood in the present instance, from what has been said above of gangrene and debility. Leeches are not to be procured in the West Indies, but it would surely be worth the trial to take away blood from the stomach, externally by cupping in the very early part of the disease, at which time only blood-letting can be of service, and before the part becomes too tender for the application of the instruments. I beg leave to recommend the trial of this, to those who may see this work, and to whom this disease is likely to occur.

It is remarked by an intelligent navy surgeon, that bloodletting is not without its use, though it may not save life, for he alledges that it alleviates the sufferings attendant on death.

The

The next of those remedies, which have of late been brought into use, to which I shall here advert, is mercury employed not as a purge, but to bring on a salivation as quickly as possible. This is done either by giving calomel in doses of two or three grains every hour, or five grains every three or four hours, conjoined with half a grain of opium, or a few grains of philonium, to prevent its running off by the bowels, or by introducing large quantities of ointment by the skin, so as to bring on salivation as speedily as possible. I find one instance in the journal of a navy surgeon, in which calomel was given with success in doses of fifteen grains every two hours, till a hundred and fifty grains were given. Half a grain of opium was given with every dose except the first. The \* testimonies in favour of this are also so strong, that its utility in many cases seems established on solid grounds, but the same allowance is to be made, as in the former instance, for the over-rated statements of its sanguine advocates. Its character, however, as a remedy generally applicable and useful in this disease, is

\* See Essay on the malignant pestilential fever introduced into the West Indies from Boullam in 1792, by C. Chisholm, M. D. and Journals of navy surgeons.

much

much better established than that of blood-letting.

The only other powerful remedy I know of, which has been lately boasted of in this disease, is cold-bathing. It has been confidently recommended by some \* practitioners of high character in the army in St. Domingo; but the testimonies in its favour, are by no means uniform, either in the West Indies, or North America. According to the account of Dr. Rush, the most full and candid trials were made of it in Philadelphia, both by medical practitioners and others, but with a degree of disappointment which made it be generally abandoned. But as it is an error to imagine that any one mode of practice is adviseable in all cases without exception, so is it unwise to presume that there may not be remedies applicable to many particular cases, though not universally and indiscriminately admissible. When the skin is very hot and dry, the dashing of cold sea-water on the patient the first day of attack, may

\* See the works of Dr. Jackson, and Dr. Maclean, above referred to.



prove a most powerful and useful remedy. The medical gentlemen of the navy, do not speak so favourably of this practice as those of the army, probably because the symptoms of re-action, as they are called, are not so strong among seamen as soldiers, for the reason mentioned above, and some of them own that they had reason to repent it, from the coldness and depression, almost irrecoverable, and even the fatal event which ensued in some cases. There is however a mitigated method of putting it in practice, in favour of which there are many testimonies. This consists in the external application of clothes soaked in cold water, or vinegar and water. It is alleged, that this was the means of recovery in some cases apparently desperate. Under this head may be reckoned cold glisters, consisting either of plain water or decoction of bark\*.

It

\* There is still another new remedy, the mention of which ought not to be omitted.

The extract or essence of spruce, which is made and employed for the purpose of preparing spruce beer (a fermented liquor made from melasses) acquired for a short time a high character for the cure of the yellow fever, in consequence of the pretended accidental discovery of the master of a merchant ship, and this character was farther

It seems an objection to the cold bath, that it is hardly compatible with the practice by salivating with mercury. An eminent navy surgeon reports, that under this course of medicine, he found benefit from the warm bath. Another reports, that he used it successfully in cases where spasms came on. The warm bath is also a likely means of producing a soft skin and a free perspiration, which is an essential point when the stomach is to be soothed, for it is sagaciously observed by Sydenham, that the stomach being commonly very irri-

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ther confirmed, by its being introduced into one of the ships of war at a time when the fever was spontaneously subsiding, as is generally the case with every epidemic after prevailing for a certain term. In the state of despair and deep affliction which then prevailed, every twig was caught at; and a very extensive trial of this medicine was made by order of government; and though it by no means answered to its first reputation, it was not found to be an insignificant remedy. It acted as a bitter cordial to the stomach, which sometimes retained it when every thing else was rejected; and being a terebinthinate medicine, it acted also as a diuretic. This is a very salutary mode of operation, as will be seen hereafter. The method of administering it, as directed by the first proposer, was to dissolve three ounces of the essence in a quart of hot water, and to take half a pint of it every two hours.

table in the plague, the most effectual means of making it retain what was administered internally was to excite a sweat.

The next powerful medicine I shall mention is Peruvian bark. The great irritability of the stomach comes on so early in the disease, that neither this nor any other medicines can be given by the mouth. Nor is it advisable to urge it in those cases, and in that period of the disease in which blood-letting is proper. But as a great many cases in this climate do not admit of free evacuation in any stage, and as I apprehend there is a certain point in most febrile diseases at which the inflammatory disposition ceases, the administration of this medicine becomes of the utmost importance. Besides, the inflammation here seems of the erysipelatous kind, and this requires the free administration of bark, even in its most acute state. The nature of the inflammation in this fever is farther illustrated, by its being observed, that suppuration is never found to have taken place in the inflamed parts.

In case the bark should be rejected by the stomach, in common with every thing else, it may be given in glyster. I even caused it to be applied in decoction, externally, to the skin, with seeming advantage. Though it is not a medicine relied on in the late practice, it seems conformable to reason as well as experience, that where it can be employed, it is likely to be well suited to a disease verging rapidly sometimes to gangrene, and always to extreme debility.

However impracticable or exceptionable the use of the bark may be in those cases which prove fatal in three or four days, in consequence of inflammation of the stomach, the same objection does not lie to those cases which are more protracted, and the termination of which resembles more that of other fevers.

The soothing of the stomach is an essential point of treatment, not only to enable it to bear medicine and nourishment, but with a view to allay general irritation and anguish.



The first medicine that naturally presents itself to our attention for this purpose, is opium. But there is no point in which practitioners are more agreed than in the inefficacy of it in this case; so that the only use made of it by the best practitioners in the early part of the disease, is to prevent calomel from purging when it is given with a view to salivate, or to make the bark be retained when it is given in glyster.

The juice of the fruits of the climate, particularly of lemons and oranges, has been highly extolled as a soother of the stomach. I did not find it answer its character in this respect; and it happened not uncommonly, that acids of every kind were loathed extremely, so as to produce nausea, and aggravate the vomiting. Where the pure acid was rejected, I have found that a composition of it with wine, hot water, nutmeg, and sugar, was very grateful to the palate and stomach. For common drink it sometimes happens, that the sick person prefers the decoction of farinaceous substances to any other liquid; and in one case in particular, which did well, the patient was led by taste to prefer warm water gruel to every other

other drink or nourishment; and the large quantity he took seemed to have a considerable share in his recovery, by keeping up a warm moist skin, and producing a great flow of urine.

The saline draught in the act of effervescence has been employed to check vomiting with evident advantage. But in most cases, this symptom is so obstinate, as to discourage all attempts to remove it. I have known magnesia and mint water have a visible effect in soothing the stomach, particularly when given after some acid beverage. Some practitioners in the West Indies, in the late war, found benefit from the infusion of chamomile flowers in checking vomiting; and a surgeon in the navy, in his journal, highly recommends, from his own experience, a weak infusion of quassia for the same purpose. The French author beforementioned affirms, that milk boiled with some flour or bread, given in the quantity of a spoonful at a time, and frequently repeated, had more effect than any thing he had tried in stopping the vomiting in this fever. I have lately heard of a practitioner in one of the islands, who administered pure milk with

the same intention, and with remarkable success. It was strongly affirmed to me by a credible person, that the same practitioner, in a case in which this symptom was at its greatest height, and in its worst form, so as to be considered as beyond relief, gave a drachm of calomel at one dose, whereby the vomiting was removed, and the life of the patient saved; the black matter, which had begun to shew itself, seeming to be carried off by stool. One instance is not sufficient to establish a practice, but as these are cases in which bold experiment seems justifiable, this deserves a farther trial.

I have seen vomiting relieved, by fomenting the stomach with stupes wrung from a decoction of bark, and sprinkled with camphorated spirits and tincture of bark.

But in enumerating the means of relieving the sufferings of the stomach, I have, lastly, to mention, what I consider as the most efficacious of any, namely, a blister to the part. In so far as I know, I was the first who used and recommended this remedy; and it was suggested to me, by observing, in examining dead bodies, that the  
stomach

stomach was the principal seat of morbid affection. I am glad to find the same practice recommended by Dr. Clarke of Dominica, and Dr. Maclean, who practised in the army in St. Domingo during the three first years of the present war. A surgeon of the navy who followed this practice with success, found that all the good effects were obtained from it without actual vesication, and therefore removed the plaster after it had produced inflammation, avoiding thereby the great suffering and tedious ulcers, so frequently the consequence of a raw state of the skin in this climate.

A practitioner of reputation has recommended alum and white vitriol for stopping the internal hemorrhage, so incident to this disease. This has not had a trial sufficiently extensive to establish its utility; reason seems to be in its favour, and therefore merits imitation.

I have no other internal remedy to recommend. Whatever power of retention there may be, more especially if the patient should survive that stage of the disease in which the inflammation of the stomach



proves fatal, should be employed in taking the bark. In the more protracted stages, camphor also will be found of service; and if given in the evening with an opiate, perspiration and sleep will probably be procured, by which the patient will be greatly relieved.

Blisters to the thighs and legs at this time, seemed also to coincide with the general intention of cure, and they appeared to be of advantage in the cases in which they were tried \*.

\* As I could not, without embarrassing the narrative in the text, acknowledge my obligations to the several surgeons of the navy, of whose observations I have availed myself in this article, I think it due to the great judgment, fidelity, and industry, with which they discharged the important duties of their station, here to say, that I am chiefly indebted to Mr. Robert Christie, of the Prince of Wales; Mr. Thomas Robertson, of the Iphigenia; Mr. Alexander Aberdoun, of the Sheerness; Mr. John Malone, of the Ganges; Mr. Robert Harris, of the Thunderer; Mr. George Sibbald, of the Canada; Mr. Thomas Kein, of the Queen; Mr. John Buchanan, of the Brunswick; Mr. Thomas Stuart, of the Vanguard; Mr. Alexander Anderson, of the Sampson; Dr. William Pattison, of the Leviathan; Mr. John Crawford, of the Success; Mr. Thomas Downey, of the Dædalus; Mr. Francis Wye, of the Rattler; Mr. Robert Williams, of the Cormorant; Mr. Daniel Campbell, of the Eurus; and Mr. — Bonicux, of the Beaver.

## 4. Of INTERMITTENT FEVERS.

IT sometimes happens, particularly in the West Indies, that intermittent fevers are so obstinate as to resist the common means of cure by the Peruvian bark; so that these complaints become extremely distressing to the medical practitioner as well as to the patient. Indeed this was a difficulty that occurred so often, that I was sometimes tempted to think, either that the great reputation of this medicine is not so well founded as is commonly believed, or that the bark generally in use in these times is not of so good a quality as that employed by the physicians who first established its character.

But, in the first place, the experience upon which its reputation was first built was in a temperate climate, where very few agues are found to resist it when properly administered. In the next place, there is reason to believe that, in fact, the medicine itself now commonly in use is not equally powerful with what was first employed;

ployed ; and a species of it, called the Red Peruvian Bark, has lately been discovered, or rather, perhaps, revived, which is certainly of a superior quality, and has been found to cure intermittents, in which the common fort had failed \*.

I was informed by Dr. Hendy, of Barbadoes, that he had found the flowers of zinc to answer in cases of intermittent fever, in which even the bark and every other remedy and mode of treatment had failed. It was found very successful in the like cases, both in my own trials at the hospitals, and by the surgeons of the men of war to whom I recommended the use of it. At the hospital at St. Lucia, in the months of February and March 1783, three intermittents, out of five which had resisted the bark, were cured by this medicine. The other two were cured by returning to the

\* The red bark was brought to England in a Spanish prize in the year 1781, and a very accurate account of its medical and chemical properties was published the year after by Dr. William Saunders, of Guy's hospital. None of it had been brought to the West Indies before the peace, so that I had no opportunity of trying it in that climate. There is a yellow Peruvian bark now in use, which is equal to the common fort.

use of the bark, and giving it in ardent spirits, with a few grains of capficum or ginger. The zinc answers best in cafes of long ftanding, where there is no complication of other difeafes, and where the intermiffions are very diftant. In fuch cafes, the paroxyfms of intermittents feem frequently to be repeated by a fort of habit, after the original caufe of the difeafe is removed. The dofe of this medicine is from two to four grains every fix or eight hours.

The white vitriol, which is a falt of zinc, was found by fome of the furgeons of the fleet to answer equally well in fimilar cafes, when given in the dofe of five grains every four hours. I did not try this in the Weft Indies, but found it to answer in St. Thomas's Hofpital, to which I was elected phyfician a few months after my arrival in England.

Opium is one of the moft valuable fubfidaries to the bark in the cure of intermittent fevers, and the employment of it for this purpofe is an important improvement in modern practice. It was firft, I believe, introduced by Dr. Lind, who recommends it



it to be given in the hot fit in a dose of twenty-five drops of the tincture. But the method of administration which has since been found most convenient and successful, and now in common use, is to give thirty drops an hour before the expected fit; and the effect will be rendered much more certain if it is given with a spirituous or aromatic liquid made hot, the patient being kept warm in bed at the periodical hour. Mr. Maclicsh\*, a surgeon in the army serving in Corsica in the years 1795 and 1796, gave opium with success in obstinate intermittents, three hours before the time of the expected attack, beginning with three grains and increasing it gradually according to the obstinacy of the case. In this manner the dose was sometimes raised to twelve grains. Much smaller doses will in general be found sufficient, particularly if conjoined with mulled wine or hot diluted spirits.

There is a practice mentioned by † Celsus, which seems rational, and deserving of

\* See Medical Annals, Vol. 2d.

† Lib. III. Cap. xii.

imitation, in cases which do not readily yield to ordinary means; it is to put the patient into a warm bath, so that he shall be there at the period in which the cold fit may be expected to recur.

The late Dr. Huck Saunders informed me, that when he was physician to the army at the siege of the Havannah, in the year 1762, he cured a number of agues which had resisted the bark, by giving two ounces of the vinous tincture of rhubarb and six drachms of the tincture of senna, seven or eight hours before the expected fit. This being repeated two or three times removed the disease. He informed me also, that he had met with agues in England which did not yield to the bark, but upon leaving it off, and putting the patient on a course of mercury, they were readily cured upon returning to the use of the bark.

Arsenic has also been found an effectual remedy in intermittent fevers. I was informed by Dr. Huck Saunders, that when he was in North America, in the war which broke out in 1755, Mr. Ruffel, a surgeon in the army, who had the medical management

ment of an expedition undertaken against the Cherokee Indians; having provided himself with a great quantity of pills, containing each the eighth part of a grain of this mineral, was enabled to cure the intermittents, to which the troops were very subject. It is a medicine occasionally used with success in modern practice, but is now commonly given in form of solution. Dr. Darwin recommends to give ten drops of a saturated solution several times in the day, or a quarter of a grain an hour before the period of the paroxysm.

Every means of inducing a powerful excitement in the principal functions of the body at the period of attack, seems to possess a power of preventing it. Not only the passions of the mind have an influence over it, but the inducing of a change in the circulation by mechanical means. Mr. George Kellie\*, an ingenious navy-surgeon, has tried with success the effect of compressing the large arteries by a tourni-

\* See observations on the medical effects of compression by the tourniquet, by George Kellie, surgeon in the royal navy, &c. London, 1797; and Annals of Medicine, vol. 2d.

quiet; and this practice has been imitated by others with the like success. The compression is to be made on the great arteries of two of the principal extremities, and continued from ten minutes to a quarter of an hour, immediately before or during the cold fit.

## CHAP. II.

### Of FLUXES.

THESE seem to arise in the same circumstances, and to be owing to the same general causes, as fevers. They may, in some sense, be considered as fevers, attended with peculiar symptoms in consequence of a determination to the bowels, just as fevers in cold climates are sometimes attended with rheumatism and catarrh. We have seen, in the first part of this work, that the dysentery arose chiefly in those ships which had been subject to fevers.

This determination to the bowels is owing to a variety of causes, but is chiefly connected



connected with external heat ; for it is most common in hot climates, and towards the end of summer or in the autumns of cold climates, owing probably to a greater acrimony of the secretions of the intestines, and particularly of the bile. Dysenteries arise in camps also at the same seasons, and in the same circumstances as bilious fevers \*.

Besides climate and season, the other circumstances determining to the one disease more than the other are, 1. A difference in the constitutions of different men ; for in the same ship it sometimes happens that both diseases prevail equally, though all the men are using the same diet and breathing the same air. 2. The nature of the occasional cause. A dysentery, for instance, is more likely to arise from an irregularity in eating or drinking ; a fever from being exposed to the weather, particularly marsh effluvia. 3. The particular species of infection that may happen to be introduced. Suppose, for example, that a ship's com-

\* Sir John Pringle on the Diseases of the Army.

pany is predisposed to acute distempers, and one man or more ill of the dysentery should be brought on board, this will become the prevailing disease, as happened in the Torbay in August 1780. If the like number of fevers should be introduced, then fevers will be the prevailing disease. 4. Different habits of life. The crew of a transport, in a voyage from England to New South Wales, were all seized with fevers, while the convicts were seized with fluxes.

These two diseases may therefore be considered as *vicarious*, the one substituting itself for the other according to particular accidents, and both proceeding from the same general causes; and this is no new idea of mine, but seems to have been Dr. Sydenham's, when he calls the dysentery a *febris introversa*. It may be farther added, that dysentery is the safest form in which this cause, which is common to both, can exert itself; for it is a disease more within the reach of art; and some of the most dangerous symptoms attending fevers seldom occur in dysentery. Among these may be reckoned head-achs and *delirium*, one of the most frequent causes of which, in feverish

G g                      affections,

affections, seem to be a stagnant or torpid state of the bowels. When dysentery proves fatal, it is in consequence of violent local affection, and that in general after it has taken a chronic form. When an incipient fever turns into a dysentery, all the symptoms, and particularly the head-ach, delirium, and *coma*, if there should be any, are immediately relieved. And the most favourable cases of the yellow fever are those in which a bilious diarrhœa comes on, while the most fatal are those in which the bowels are so torpid as to be insensible to any stimulus either from their own contents or from medicine.

I shall not enter into a minute description of this disease in all its stages, as this has been so ably executed by Sir John Pringle, Sir George Baker, and other authors, but shall only give a sketch of some of the most remarkable symptoms, particularly such as are peculiar to the climate and habits of life in the service in which I was engaged, so as to explain the varieties that may be necessary in the mode of treatment.

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The fluxes that arose in the fleet were either what may be called the acute idiopathic dysenteries, or a dysenteric state of the bowels from neglected diarrhœas, which was most apt to occur in the convalescent state of fevers, or in men labouring under the scurvy. The body is more susceptible of infection in a state of weakness from these or any other causes; and in hot climates the dysentery seems to be more infectious than fevers; for at hospitals it was so frequently communicated to men who were ill of other complaints, that it was in these the principal cause of mortality. For this reason particular attention was paid to the separation of those who were affected by it, from those who were ill of other complaints.

I have met with some violent and untractable cases which proved fatal in the acute state; but, in general, this disease draws out to a chronic form in this climate, and does not prove mortal for many weeks. The usual cause of death appears, from the inspection of the bodies, to be an ulceration of the great intestines, particularly of the descending colon and the rectum. This part



of the intestinal tube is most affected from its being the receptacle of all the acrid secretions from the rest of the canal ; and it is naturally more subject to congestions of the fluids and incurable ulcers, as appears from the rectum being so liable to the hæmorrhoids and the *fistula*. This ulceration of the great intestines is so common, that, out of eight cases which I inspected after death, seven had this appearance. The case in which there was none was not so much a case of dysentery as of inflamed bowels, brought on by the man having drank to excess of spirits while he was recovering from a dysentery. The severe *tormina*, which always occur in the first days of the disease, seem owing to an inflammation which terminates in ulcers ; and these being constantly irritated by the sharp humours, produce the *tenesmus*, which is the symptom most essential to dysentery in the after part of the disease. Any diarrhœa may in this manner become dysenteric. During the acute griping at the beginning, the stools are loose and copious ; but as soon as the tenesmus takes place, they are scanty, which is most probably owing to the spasmodic strictures in the great intestines, in consequence

quence of their excoriated surface being irritated by acrid fluid. The inflammatory state is more lasting and violent, the gripings are more severe, and the danger is also greater in this stage of it in a cold than a hot climate.

The state which the great intestines fall into in old dysenteries, seems to have something in it peculiar to itself: the several coats become thick and spongy; their texture is obliterated and destroyed; and they become of a black or very dark purple colour. This, however, cannot be called mortification; for the fibres of the gut do not lose their tenacity, nor is there that putrid and dissolved state in which gangrene consists; but it advances in time to such an extreme state of disease, as to be entirely incapable of recovering its natural appearance and functions, and proves therefore the cause of death.

The greater frequency and obstinacy of these chronic fluxes in hot than in cold climates, seems to be owing to the same weakness of the powers of life, induced by heat, which make recovery in general so tedious,

and particularly that of wounds and ulcers. The greater quantity of acrid bile will also tend to keep up the ulceration. Dysenteries have also this disadvantage, that the Peruvian bark, which is the most powerful restorative in other complaints of this climate, is here in most cases found to be inadmissible on account of the heat, thirst, and other febrile symptoms, which it seldom fails to induce in all stages of this disease.

#### TREATMENT OF FLUXES.

T H E R E are few diseases in which a prudent employment of art is more useful, or in which early means of relief are more requisite than in this\*.

Where the dysentery is the original disease, and when the patient is robust, and

\* This is elegantly expressed as follows, in Sir George Baker's learned Dissertation on this disease:—"Primo  
 "neglectus tractatu asperior occurrebat; etenim corpus  
 "extenuatum atque confectum ut morbo fervido impar  
 "erat, ita ipsi impar curationi. Itaque optimum erat  
 "occurrere ipsis principiis atque auxilia mature præri-  
 "pere. In hoc enim corporis affectu aliquod certi in  
 "medicina opus est, haud multum in naturæ bene-  
 "ficio."

plethoric,

plethoric, with acute pain and a strong pulse, blood-letting may be practised with advantage in the beginning of the complaint. But there is no part of the practice in this disease, in which the climate and manner of life makes a greater difference than in this ; for in a temperate climate it frequently happens that repeated blood-letting is necessary ; but in a hot climate, where the fibres are relaxed, and in the constitutions of seamen, whom we seldom or never find plethoric, the inflammatory symptoms requiring this evacuation do not run so high, nor continue so long.

It is in all cases of the utmost consequence to administer as early as possible a brisk saline purgative. An ounce and a half or two ounces of purging salts may be dissolved in a quart of barley water or water gruel, and given warm in cupfuls, at small intervals, till a free and copious evacuation is produced. If there should be much fever, or sickness at stomach, two grains of emetic tartar will be a great improvement of this medicine ; and there will be this farther advantage from its use, that if the stomach should be loaded with bile, in which state



it is more irritable, an evacuation upwards will also be excited to the great relief of the patient.

This early and seasonable measure will, in many cases, put a stop to the disease, especially if the patient is thrown into a sweat immediately after the bowels have been thus thoroughly evacuated. It is of great service in this disease to promote free perspiration, and even a plentiful sweat, which may be effected with great advantage by giving, at bed time, a medicine composed of opium, ipecacuana, and a little neutral salt, accompanying it with plentiful warm dilution. Nothing tends more to relieve griping and tenesmus than a general warm moisture on the skin. The ipecacuana, which is an ingredient in this medicine, is one of the best anti-dysenteric remedies we know; the opium procures rest; and this, joined to the sudorific effect of the whole, not only gives a temporary relief, but tends to carry off the disease. It is most properly given in the evening; for there would be this inconvenience in constantly encouraging a sweat, that if the tenesmus should return, it would either be checked by the patient getting

getting frequently out of bed, or there would be danger of his catching cold. I am well aware that we cannot be too cautious with regard to the use of opium in the beginning of this disease ; but it is admissible more early in a hot climate than a cold one, as the inflammatory symptoms are less violent and can be sooner subdued ; besides, it becomes an entirely different medicine when conjoined with the other ingredients that have been mentioned.

The best medicine in the day time we found to be small doses of ipecacuana alone twice or thrice a day ; and if there should be fresh collections of bile, small doses of the saline purgative will be necessary. Ipecacuana, in this intention, may be given in the dose of two grains in athletic constitutions, such as those of seamen ; but in the more delicate constitutions, such as are commonly met with in private practice, one grain is a sufficient dose. I have found manna and tamarinds a good addition to this medicine in the earlier stages of the disease, where there was much bile ; but in a more advanced stage of it they are apt to produce gripings and flatulence,

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The marks of a redundance of bile are, a sickness at stomach, a sense of scalding at the anus when the stools are passing, and the yellow or green colour of the stools themselves. It is apt also to excite symptoms of fever, such as a foul tongue, a hot and dry skin, with thirst. When collections of it are suspected in this disease, it is best to evacuate it by vomiting, for it is thereby prevented from irritating the bowels, and from arriving at the inflamed parts with, perhaps, increased acrimony, acquired in passing through the whole length of the intestines.

Some gentlemen of the fleet informed me that they found oil of almonds a useful addition to the purgative. Others as well as myself made a practical comparison of the saline purgative with that composed of rhubarb and calomel, as recommended by Sir John Pringle, and we gave the preference to the former, as more easy, speedy, and effectual in its operation, especially in the first stage. Cases may occur, however, in which the other may be more advisable; for where there is a sense of weight about the stomach; which most probably arises from  
from

from the biliary organs being clogged with bile, and where emetics have failed to remove it, or the weakness of the patient may render them improper, then calomel has the best effect: for it was formerly observed, that it tends to loosen the secretions, and to stimulate the more distant excretories, such as the biliary ducts.

It is very important to caution young practitioners concerning the employment of opium in all stages of this disease, but especially in the beginning; for though it is an excellent remedy when seasonably and judiciously employed, it is very liable to abuse, particularly in the hands of the inexperienced, who may be tempted to give it improperly from an anxiety to relieve; but as more harm may arise from an unseasonable administration of it, than could be compensated by the best-timed use of it, it is safest to err on the side of caution and omission. The principal caution to be observed with regard to this remedy is, to premise suitable evacuation, such as blood-letting, if necessary, but more especially purging. It is always pernicious to give it in its pure state during the *tormina*, so common



mon in the first days. By these I mean the abdominal gripings, which denote inflammation, and are entirely different from the *tenesmus*, which is a more constant and characteristic symptom of the disease, and seems to arise from irritation and spasms of the rectum and colon.

It was in this disease that I first observed the good effects of a small quantity of neutral salt, in taking off the inconveniencies attending opium, such as the feverish heat and confusion of the head, which it is apt to produce in many constitutions; and as the administration of the anodyne coincided with the evening dose of ipecacuana, I was led to adopt a form similar to that of Dover's powder, but with only half the quantity of opium; or, it was given in a liquid form, by combining twenty drops of thebaic tincture and a drachm of ipecacuana wine, with nitre from five to ten grains, in any simple vehicle in form of a draught. There is a very observable difference, in some cases, between opium given in a liquid and in a solid form; and the former is much more certain in its effect, when the intention is to procure speedy and effectual ease.

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I have observed great benefit from the use of external remedies in dysentery, and these have, perhaps, been too much neglected by authors and practitioners. The warm bath is of great service, especially where the gripes and tenesmus are severe, and where the fever has been taken off by previous evacuation. Fomentations or warm applications of any kind to the abdomen give temporary relief; and it will be found of advantage to keep those parts, at all times, well defended from the cold air. Blisters to the abdomen were also found of use, and likewise acrid liniments, composed of oil, volatile spirits, and tincture of cantharides. Where the stomach has been much affected, I have perceived relief from fomenting it with stupes, upon which thebaic tincture and camphorated spirits were sprinkled, as recommended by Dr. Lind. I was once affected with a bad dysentery in the West Indies, and I thought myself much relieved by the warm bath and a blister. Strangury is not an uncommon symptom in this disease, independent of cantharides, and the most sensible and effectual relief is derived from fomentations to the  
pubes

pubis and perinæum, as I also experienced in my own case.

I have in private practice found great comfort and relief afforded by a fomentation of the *anus* with hot water or decoction of camomile flowers with some laudanum sprinkled on the stupes. This has so sensible and sudden an effect in allaying the agonies of tenesmus, that any patient who has once experienced the good effects of it will not fail to call for the repetition of it upon the recurrence of the same sufferings. This operation also relieves strangury. The *sphincter ani* is possessed of great sensibility and sympathy, so that any impressions made upon it are readily communicated to the intestines and bladder.

What has been hitherto said regards chiefly the acute dysentery; but the most frequent and troublesome complaint that occurred at the hospital, was the same disease in what may be called its chronic state.

There is a considerable variety of symptoms in all the stages of this disease, but  
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particularly in the more advanced or chronic state, so that a corresponding variety is necessary in the modes of treatment, and there are few diseases in which there is more room for discrimination.

In all stages of it an accurate discernment is necessary with regard to the use of opiates, and great part of the practice here consists in timing these well. They are least admissible in the beginning, where evacuation is the principal object; but as the disease advances they become more and more allowable and useful. The principal cautions necessary in their administration are, 1. To premise sufficient evacuation, so that the intestines may not be loaded with bile, *scybala*, or any other irritating matter at the time of giving the opiate. 2. To obviate the effects which an anodyne has of causing a retention of the contents of the intestines. This may be done either by giving something purgative along with it, or after it has produced its quieting effect. The former method seems preferable; for as soon as the effect of the opiate is over, the purgative is ready to act; and in this way it is so far favourable to the operation of the purgative,



gative, that large feculent stools will be discharged: whereas, had the purgative been given alone, it would have been more apt to produce scanty griping stools, attended with tenesmus. Rhubarb answers well in such cases, and may be given in a dose from twelve to twenty grains, according to the age and constitution. 3. To prevent feverish heat and delirium. This was proposed to be done in the first stage of the disease, by combining it with ipecacuana and a little neutral salt. With the same intention, it may now be joined with a few grains of Dr. James's powder, or \* *vitrum ceratum antimonii*, in which form it would not be so strongly sudorific, an effect not so much required in the chronic as in the acute state. A clean tongue, as it denotes the absence of fever, is one of the symptoms that chiefly justifies the use of opiates.

The principal causes that keep up the flux, and render it so obstinate, are, 1. A too great secretion of bile, either continual or frequently recurring. 2. Ulcers in the great intestines. 3. A lienteric state of the bowels. 4. A retention of *scybala*.

\* See Medical Essays of Edinburgh, vol. v.

The first cause is much less frequent than might be expected by those who fancy that every disease of this climate proceeds from bile. When there does occur a redundancy of bile, there is more occasion for the employment of evacuant medicines, and more need of caution in that of opiates. A medicine that will dispose the liver, or the circulating system in general, to form less bile, is a *desideratum* in physic; but in case of an excessive flow of it, emetics and mercurial purgatives, as has been already mentioned, are the best means of evacuating it; and care should be taken that it be discharged before it accumulates too much, or becomes acrid by too long retention.

In order to obviate that irritation in which tenesmus consists, great benefit will be found from the injection of emollient and anodyne clysters, to wash off and dilute the acrimony, and to sooth the parts so as to allow them to heal. A strong infusion or decoction of linseed or starch may first be given to the quantity of near a pint, to be evacuated after a short retention, and then a few ounces of the same, with thirty or forty

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drops of laudanum, to be retained for a time, in order to procure rest.

I was at first tempted to think that a very frequent injection of such clysters would be very useful, by cleansing and soothing the colon and rectum, so as to prevent farther exulceration, and dispose the parts to heal. But besides the objection arising from the tenderness of the intestine, which, in some cases, renders the operation itself painful, I found that if they were given oftener than once a day, they rather increased the uneasiness, and made the patient feel languid and exhausted; so true it is, that no practical rule can be established from reason alone, without being brought to the test of experience. The rectum seems to have a peculiar sensibility, and a remarkable consent with the whole system; for the act of evacuating the rectum will induce syncope, or even death, in a state of great debility. Clysters may be pernicious, even though they produce no evacuation of *feces*; and Sydenham has remarked, with respect to other diseases, that their unseasonable or too frequent use greatly debilitates and disturbs the patient. When not abused, however, they

they are of the most eminent service in this and other complaints.

Certain medicines, which have been called *sbeathing*, have been recommended to be taken by the mouth. Of this kind are mucilage, oil, and wax. I have made trial of mucilage, such as starch, without any sensible effect, probably because it loses its qualities by the powers of digestion, before it reaches the part upon which it is intended to act. With regard to oil, I have hardly enough of experience of my own to decide; but some of the surgeons of the fleet informed me, that they found advantage from combining it with the purgatives. I was discouraged from using it by finding that it was apt, in the West-Indies, to become rancid on the stomach, and for this reason I soon laid aside the use of the castor oil, which, though produced in that climate, seems to answer better as a medicine in Europe. But since my return to England I have used, with great benefit, at St. Thomas's hospital, a medicine, composed of tincture of rhubarb and oil, in old dysenteries, attended with discharges of blood. I took the hint of this from finding it of



great service in high-seated piles, as recommended by Dr. Griffith\*. It is necessary to combine something purgative with the oil, otherwise it might be altered by digestion, or absorbed, or might become rancid by too long retention in the first passages. Wax is a body not changeable by digestion, and seems therefore well suited for the purpose of sheathing the bowels; and I have found advantage from the preparation of it recommended by Sir John Pringle†, on the authority of Dr. Huck. I have also seen some advantage in old fluxes, in St. Thomas's hospital, from the use of spermaceti, given with an equal quantity of conserve of roses and half as much absorbent-powder, agreeably to a form in use at that hospital.

The climate has a great influence in pre-

\* In Dr. Griffith's form of his medicine for the piles, six drachms of fresh-drawn linseed oil are joined with two drachms and a half of the vinous tincture of rhubarb, and a scruple of bole armoniac, and given twice a day in a draught. I commonly used oil of almonds at the hospital. This may be considered as another instance of those useful combinations of medicines, which experience alone sometimes discovers.

† See Diseases of the Army, p. 273. 6th Edit.

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venting these ulcers from healing, upon the same principle that it prevents the cure of external sores and wounds, so that there are cases that admit of no cure but from a change of climate. I have seen in some cases of old dysentery, small, round, ill-conditioned ulcers break out on the surface of the body, which seemed to proceed from the same general habit that produced those of the intestines. There was something peculiar in the appearance of those external sores, being like small round pits, as if a part of the skin had been removed by caustic, and with little or no discharge. In a case of this kind, which proved fatal, I found the whole surface of the great intestines beset with small ulcers, not unlike those on the skin.

Since the first edition of this work was published, I have met with a pamphlet, written by Dr. Houlston, of Liverpool, in which the friction of mercurial ointment on the abdomen is recommended as a cure for old fluxes; and I have tried this practice in some very obstinate cases in St. Thomas's hospital with success. In these cases it is probable the disease is kept up by a

vitiated state of some of the various secretions belonging to the intestinal canal, which the mercurial alterative tends to correct; or perhaps, according to the ingenious theory of Dr. Darwin, the operation of mercury here, as in other cases, consists in exciting absorption.

The next cause that was mentioned of the long continuation of fluxes, was a lenteric state of the bowels. This consists in a great irritability of the whole alimentary canal, whereby all the *ingesta* are transmitted so fast, that there is no time for assimilation. Liquid aliment, such as broth, is particularly subject to this inconvenience. There are few cases of long-protracted fluxes in the West-Indies, without this symptom in some degree.

The remedies that are here found of most service, are such as counteract irritability or relaxation, or promote absorption. It is in cases where this is the prevalent symptom, that opium may be most freely used. Frequent and small doses of the compound officinals, such as theriaca, pulvis e bolo compositus, or diascordium, have been found

of service. Though the state of weakness would seem here to indicate the Peruvian bark, yet it is only in some few very advanced cases that it is found of service. But there are other bitters that are found more frequently effectual in restoring the tone of the bowels. Of this kind are simaruba, quassia, camomile flowers, and colombo root. The first has been reckoned a specific in this sort of flux; but though its powers are undeniable, it will be found frequently to fail\*. I have also used, with advantage, an infusion of gentian and cinnamon in Port wine. Something aromatic has a good effect when added to the bitter, being adapted to prevent or obviate flatulence, which is a common and troublesome symptom in this complaint. A purgative of calomel and rhubarb is adviseable from time to time in this form of the disease, and also external mercurial friction if it should be obstinate.

That

\* Since coming to England, I have been informed by Dr. Garden, a learned and ingenious practitioner from South Carolina, that this medicine, in order to produce its proper effect, should be given in a very weak decoction; for that after having almost abandoned it in conse-



That class of remedies which may be called pure astringents, might seem at first sight well calculated for cases of this kind. Of this sort are the *terra Japonica extractum campechense*, and *cortex granati*; but though I have frequently seen evident benefit from these, there are many cases in which such medicines are found by experience to be of no material service.

The absorbent earths are a more useful remedy in this form of the disease. They have, perhaps, a restraining effect independent of their power of absorbing acid. It is certain, however, that great part of their use consists in the destruction of acid, which is very apt to be generated in that depraved state of digestion which takes place in advanced fluxes, particularly in this lenteric state of the bowels. In the early and acute state the vegetable purgatives, such as cream of tartar, tamarinds, and manna, are proper; but in this advanced stage they are hurtful by the acidity and flatulence which they

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quence of its failure when he gave it in strong decoctions, and in substance, he was again convinced of its efficacy by using it in a very weak decoction, a scruple being boiled in a pint of water to half a pint.

produce,

produce, and both the food and medicines should be so calculated as to avert and correct those inconveniencies. There is something in vegetable acids extremely unfriendly to a weak state of the bowels in general, tending to bring on spasmodic gripings, and preventing a healthy digestion and assimilation, as we know in the case of those who are subject to heartburn, and of those who make use of vinegar to check corpulency, by preventing the formation of blood. Vegetable acids, however, are admissible where there is a redundancy of bile, or where the excrements are putrid; and Dr. Zimmerman recommends tamarinds as a useful medicine in what he calls the putrid dysentery.

Lime water has been recommended in old fluxes, and I tried it in several cases. Except in one, I could not perceive any benefit from it in the West-Indies, but found it answer better in England. I was informed by the late Mr. Adair, surgeon-general to the army, that the duke of Gloucester was cured of a very dangerous lenteric flux by this medicine.

Absorbents may very properly be combined in prescription with some of the compound-  
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pound-officinal opiates, and a medicine will thereby be formed, which will have at once the advantage of an anodyne, a bitter, an astringent, a carminative, and absorbent. As these earths have little or no taste, they may also be added, with propriety, to the common drink, as in the form of the chalk julep, or *decoctum album*.

I have seen benefit in lenteric fluxes from a scruple of lapis calaminaris, finely levigated, and given three times a day. I have also, in similar cases which occurred at St. Thomas's hospital, found benefit from a yellow gum lately imported from Botany Bay. The dose was a drachm of the tincture three or four times a-day, made in proof spirits, in the proportion of a drachm of the gum to an ounce of the spirits.

A proper regulation of diet, as well as medicine, is of the utmost consequence in this disease. A free indulgence of animal food is pernicious, particularly in the first stage of it. In the chronic state, a moderate use of it is allowable, and in the lenteric state it answers better in a solid form than that of broth, which is apt to gripe and to run  
quickly

quickly through the bowels. The best general articles of diet are farinaceous bodies; and these are greatly improved by being toasted brown before they are used. It was observed, in a former part of this work; that the flux was supposed to have been prevented, in the fleet commanded by Sir Charles Saunders, by throwing burnt biscuit into the water used by the crews of the ships. It is a good practice to put a well-burnt toast into all that the patient drinks, and toasted bread, or panada made of toasted bread or biscuit, is one of the best articles of diet. Brackish water ought to be avoided, as it ruffles the bowels when in so delicate a state. Fermented liquors are improper, except when the disease is advanced, and where weakness and relaxation are the prevailing symptoms. Malt liquor will hardly ever agree, on account of its acidity and flatulence. Of wines, Port is to be preferred as the most strengthening; Madeira as the least subject to acidity: and, for the common men, no drink of the fermented kind is safer than a moderate quantity of spirits diluted with water.

Warm



Warm clothing is of the utmost consequence in this disease, and external warmth of the abdomen tends greatly to soothe the bowels. I have seen good effects from a warm gum plaster constantly worn on that part. Though cold is in general hurtful and unsafe, I have nevertheless known the sailors, who, by their habits of life, are commonly heedless, bathe in the sea when labouring under what they call the white flux, not only without any bad effects, but with manifest benefit.

It sometimes happens that this disease baffles every effort both of medicine and diet, so that a change of climate becomes the only resource.

The last cause of habitual flux that was mentioned was the retention of *scybala*, which keeps up the irritation and tenesmus. It is very natural to neglect purgative medicines when there seems already to be too great a discharge by the bowels; but there is this inconvenience from omitting them for a length of time, that those hard lumps of feces, called *scybala*, are apt to collect in  
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the cæcum and cells of the colon, as I have seen upon inspecting the dead bodies; and the fibres of the intestines being weakened, their natural strength is not sufficient to expel them without being stimulated by a purgative. It is therefore necessary to give some evacuant medicine from time to time, even though there should be no griping nor any marks of acrimony in the intestines. Rhubarb is allowed to be one of the best medicines for this purpose; and I have also known a combination of salts and senna have a good effect after a long neglect of purgative medicines. It is probable, from the durable effects produced, that these do not operate merely by the expulsion of *scybala*; and we can conceive that they may be of service by the removal of certain depraved fluid secretions, or that they may stimulate the vessels to a more healthy action, the glands to a more natural secretion, and actuate the absorbents. Be this as it will, experience teaches that in all fluxes it is of advantage to interpose from time to time some purgative medicine.

From the preceding view of the variety of causes which tend to keep up this disease,  
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it will appear that great judgment and discrimination are necessary in varying the practice according to circumstances; and there is no disease in which there is room for more attention and nicety in adapting the different remedies to the different symptoms. We can hereby also account for the various characters that different remedies have had, some having been extolled by one practitioner, while they have been pronounced insignificant by another; for no one remedy will suit all the various cases of this disease. As it is of the greatest consequence to distinguish these cases, I have been more particular and diffuse on this article than any other; and having laboured under this complaint myself, I was naturally led to take a greater interest in its treatment, and had also thereby a better opportunity of making observations on it.

## C H A P. III.

## Of the SCURVY.

I SHALL not be so minute, either in the description or treatment of the scurvy as of the preceding diseases. A detail of this kind would lead to unnecessary prolixity and repetition; for the prevention and cure of it, consisting in diet rather than medicine, have been fully handled in the narrative part of this work; and the subject, in the description, as well as the practical part, has in a manner been exhausted by Dr. Lind, whose treatise on this subject is more full, judicious, and satisfactory, than that of any other author; and this work is more complete in all points, than any other work with which I am acquainted, upon any other medical subject.

It has appeared, that the principal source of scurvy is a vitiated diet, consisting in salted animal food, the fat part of which is considered



considered by several \* navigators as the most productive of this disease. It has been seen also, that it is very much promoted by cold, moisture, filth, sloth, and dejection of mind. Hard labour has been assigned by some as a cause; but this is not conformable to my observation, and what has been related to have happened in the † Conqueror, as well as other facts which have occurred to others as well as myself, more particularly led me to be of a contrary opinion. A fact mentioned in Captain Cook's Voyage to the North Pacific Ocean, may be also alledged in favour of this. He remarks, that the Kamschadales, who were habituated to hard labour, were free from scurvy, while the Russians and Cossacks, who were in garrison in their country, and led indolent lives, were subject to it, though they used the same sort of food.

Though this disease is very seldom known except under the use of salt provisions, yet these are not absolutely necessary to its production. It is known in cold climates un-

\* See the Voyages of Captain Cook and Captain Colnett. *and Van Boven*

† See page 315.

der the use of diet very scanty, though not salt; and at the same time under the influence of cold, damp, and foul air, and indolence.

There has occurred, in the course of this war, a very striking proof that scurvy may be produced without the use of salt provisions. Portchester Castle not being capable of accommodating the French prisoners in 1798, part of them were lodged on board of a ship in the adjoining creek, and were victualled in the same manner as those in the castle. Their allowances consisted chiefly of fresh animal food and pease, without any salt provisions. The true sea scurvy broke out in the ship, but not in the castle. This, I apprehend, was owing to the more close confinement of the men in the former situation, whereby they were deprived of fresh air, exercise, and recreation, while the others had the benefit of an airing ground. The ship was also more crowded, more damp, and less clean. Under all these disadvantages, however, the scurvy would not have arisen, had fresh vegetables been used; and this is a sufficient proof, that farinaceous substances, unless in a sweet or fer-

mented state, such as malt, beer, soft bread, or flummery, are not antiscorbutic.

There seems to be something in the habits of life in a ship, whether at sea or in port, favourable to sea scurvy. The ships belonging to the channel fleet in 1794 and 1795, were subject to the scurvy even when at Spithead, though the men were fed with fresh beef and drank beer. This would not happen to men in a garrison. The difference of these situations consists, partly in the superior dryness, cleanliness, and ventilation of the latter; but more, I apprehend, in the want of exercise and recreation on board of a ship.

The scurvy generally begins to shew itself between the sixth and seventh week after men have been on sea victualling. The first visible symptom is generally sore gums, which are affected with a spongy swelling, and bleed upon the least touch. The next most obvious symptom is, livid blotches or wheals on the fleshy parts of the legs, under which hard caky substances are felt. This hardness increases and extends to other parts as the disease advances; and  
is

is considered as a mortal symptom when it reaches the trunk of the body. These symptom seems owing partly to coagulated masses of extravasated blood, partly to an *error loci* of the red globules, into the colourless order of vessels, where they stagnate. The face has a lurid bloated appearance, and the legs, near the ankles, become somewhat œdematous.

The most remarkable symptoms next to these, is a lassitude and depression of spirits. A small degree of exercise produces laborious breathing. This, and pains of the thorax, are some of the most distressing symptoms in the advanced stages of the disease.

Debility and lassitude increase as the disease advances; and these, together with pains of the limbs, and contractions of the hams, confine the diseased person to bed; and any rough motion, or an attempt to raise himself to the erect posture, is apt to bring on syncope.

In the most advanced stages of the disease, they frequently expire on occasions of



this kind, or in the act of carrying them on shore for cure, upon their arrival in port. In the same stage of it, the callus of broken limbs is dissolved or absorbed, so that the part comes to be in the state of a recent fracture.

The appetite for food is in general unimpaired in every stage of this disease. The urine is scanty, and high coloured.

When a part is bruised in any stage of this disease, and even before the disease shews itself by visible symptoms, there follows a tumour which is found to be filled with liquid blood; and any wound, however small, especially in the lower extremities, is apt to fall into a foul ulcer, very difficult of cure. There is a great tendency to hæmorrhage, either spontaneous or upon the smallest injury.

The skin becomes dry and rough, indicating a want of perspiration. Besides the livid spots already mentioned, there are small specks, generally of a purple colour, very little raised above the surface of the skin. There are no cutaneous eruptions of the  
scabby,

scabby, moist, or purulent kind, as in impetiginous affections, or what is sometimes called land scurvy; and it is here proper to observe, that the sea scurvy, neither in its symptoms nor nature, has the least similitude or affinity to cutaneous affections, or any other complaints met with at land.

There is a remarkable symptom sometimes attendant on this disease, which has escaped the notice of authors. This is the *nyctalopia* mentioned in Mr. Telford's report \*. It was also common in the garrison of Gibraltar, among those affected with the scurvy during the siege, as I was informed by Mr. Cairncross, surgeon to one of the battalions. It sometimes takes place in that incipient state of the disease, which does not shew itself by any visible symptom, but betrays itself, as mentioned above, by *ecchymosis* in case of bruises, or by scorbutic ulcers.

But I shall not pursue the description of this disease into its minute symptoms and varieties, but refer the reader to Dr. Lind's

\* Vide page 6.

work, thinking it sufficient here to have enumerated such appearances as may convey a just idea of it, and enable one unacquainted with the disease to recognise it.

The most striking appearances upon examining the bodies of those who die of it, are a tender state of the muscular fibres, which are easily broken or lacerated, large effusions of coagulated blood into the cellular membrane, an acrid fluid in the cavity of the thorax and abdomen, a separation of the cartilages and epiphysis from the bones, and an enlargement of the cavities of the heart. The sensible qualities of the blood are found but little different from what they are in healthy subjects.

With regard to the prevention and cure, enough has been said in the preceding parts of this work, to prove that fresh vegetables and lemon juice are the only effectual antiscorbutics. I shall here mention a fact farther in proof of the effect of vegetables. When the fleet arrived at Barbadoes in May 1781, part of the soldiers, who served as marines, were affected with the scurvy; and being sent to the army hospital, where

at

at that time no fresh animal food was allowed, they recovered much faster by being confined to vegetable articles alone, than the seamen who were fed upon fresh animal food without any fresh vegetables.

It has appeared that the juice of a particular class \* of fruit far surpasses every other remedy, whether dietetic or medicinal. It is difficult to decide under which of these heads it should be reckoned; but its powers in both respects are so eminently and singularly efficacious, as not to be equalled by the virtues of any other remedy as yet known in any other disease. When the shortness of time also, as well as the certainty of its effects, and the small quantity in which it operates are considered, it comes nearer to the description of what is vulgarly called a *charm*, than any other medicinal article with which we are acquainted.

\* It has been mentioned before, that this class is the hesperidæi; but it is to be remarked, that they are medicinal only in an acid state, for sweet china oranges have been known to fail in curing the disease.



It requires but few words to convey an idea of the great benefit derivable to the service from the proper application of this remedy. It must be obvious to every one, that whatever enables a ship of war to keep the sea double the time this could otherwise be done, as has been found to be the case this war (1799) both at home and abroad, must give a double efficiency to such a ship for the purposes of war, and must enable single ships and squadrons to prosecute certain services, to which they would otherwise be inadequate. A ship supplied with lemon juice, can keep the sea for four months with less detriment to the health of the men, than for two months without this article of refreshment. Besides the advantage of this upon long voyages, it is evident that in cruizes also, the benefits are incalculable, and too obvious to require being specified. It may also be remarked, that without this assistance to the health of mariners, war and commerce could not avail themselves of certain contrivances peculiar to this age, highly important to navigation, and honourable to human ingenuity. I allude to the lunar observations, and time-pieces for ascertaining the longitude, where-  
by

by ships can prosecute a voyage of any length without making the land; and also to the sheathing in copper, whereby the necessity of frequent careening is superseded. Were it not for the resource of lemon juice, the health of men could not keep pace with these improvements; for in former times, long and frequent stays in port were necessary for the health of the men, as well as the repairs of the ship.

The introduction of this article may therefore be considered as an æra in the internal œconomy of our navy. It is, however a curious fact, though mortifying to human wisdom, and to our national sagacity, that the virtues of this remedy were equally well known in the beginning of last century as they are at this moment; yet it has never till now attracted the attention either of medical men or of sea officers, to the degree it ought; insomuch that it had, in a great measure, fallen into neglect, when the knowledge of it was revived, and its character retrieved, by the writings of the late Dr. James Lind, physician to Haslar hospital. It has at last attained the estimation it deserves; and the  
British

British navy is now availing itself to the utmost of this inestimable resource \*. It is now a regulation in fitting out ships, not only to put in the surgeon's custody a sufficient quantity for the sick, but there is enough put in the custody of the purser, either for the whole crew, or for men who, though still fit for duty, have obscure symptoms of

\* It may be here worth while to relate in what manner the late general introduction of lemon juice into the navy was effected. In the end of the year 1793, rear admiral Sir Allan Gardner, then one of the lords of the admiralty, having been nominated to the command of a considerable squadron destined to the East Indies, consulted me on the medical arrangement of it; and I advised him, among other matters, to apply for a large supply of lemon juice. This he did, and obtained it; but this expedition having been laid aside, and a much smaller force having gone out soon after under the command of rear admiral Rainier, there was more than a sufficient quantity of this article to supply the whole crew of the flag ship, which was the *Suffolk* of 74 guns. This proved a voyage of nineteen weeks without touching at any port, and without any supply of fresh provisions; yet upon the arrival of the *Suffolk* at Madras, there were only fifteen upon the sick list, none of whom were affected with scurvy. In consequence of this report, and the good effect of it on some ships of the channel fleet, to which part of admiral Gardner's stock had been spared, the general supply mentioned above was ordered. The quantity given daily to each man was three quarters of an ounce, with two ounces of brown sugar.

scurvy.

scurvy. It was originally intended that the whole ship's company should at all times be supplied with it after the small beer was expended; but the difficulty of procuring a sufficient quantity, owing chiefly to the war with Spain, which broke out at that time, gave occasion to the partial supply above-mentioned, and the general supply is limited to remote voyages and particular services.

It may here be asked, how it comes to pass that mercury and the venereal disease are constantly coupled together, in the mouths even of those who do not belong to the profession, while a like relation between lemon juice and the scurvy has had so much difficulty to make its way in the world as a popular and established fact, a fact not only curious and interesting in a medical and natural view, but highly important as a matter of national concern. It may therefore be safely affirmed, that had such an association of ideas been established in the mind of sea officers, it would have saved the lives of many thousands of mariners.

It



It is difficult to account for this; but it may be owing partly to this circumstance, that society in general not being obnoxious to the sea scurvy as it is to the other malady, the cure of it is not a matter so generally interesting; partly perhaps to this, that while the one remedy is a simple production of nature, not promising any extraordinary medical virtues, nor such a distinctive pre-eminence over other acids, the other is a professed article of the *materia medica*, being a mineral prepared by chemical processes, and acting powerfully and sensibly on the animal œconomy.

As there are few situations in which fresh fruit can be procured, it will be necessary that the lemon or lime juice intended for the sea service, should be preserved in bottles, mixed with a tenth part of spirits of wine, or any ardent spirits, to prevent it from spoiling. Simple expression, and clarification by the subsidence of the impurities, is all the preparation it should undergo. If fire is used in preparing it, as in the form of a rob, I know for certain that its virtues are thereby destroyed.

The

The dose, as a preventive, may be somewhat less than an ounce in the day; in slight cases, two or three times as much; and in the worst cases, it may be given to the quantity of a pint daily. It is remarkable, that this quantity, and even a much larger, produces no disturbance in the stomach, as it would do in the ordinary state of health.

During the war in which I served, the fleet was furnished with essence of malt, but the powers of it were found so inconsiderable, that some of the surgeons denied that it had any. In trials, however, which were made in an early state of the disease, it was found, like all other sweet juices, to have a sensible effect in checking and removing it. It was also found of evident use in the bad ulcers, so apt to arise in scorbutic habits; and in this intention was superior to the Peruvian bark as an internal alterative. It is however, in this and all other points, so much inferior to lemon juice, that it is now abolished as a matter of unnecessary expence.

Though

Though vinegar, and other vegetable acids, will not cure the disease, without the assistance of fresh and vegetable diet, and therefore not in the least to be compared to lemon juice, yet there are proofs of its sensibly retarding the progress of it. A fleet of ships employed in the India commerce, having made a tedious voyage from China to St. Helena, were all affected with the scurvy in a high degree, except one ship, in which the only difference in the treatment of the men, consisted in mixing vinegar with the water used as common drink.

In short, there is nothing yet known except lemon juice, which possesses any certain and considerable curative power over this disease without the assistance of proper diet. With this assistance, however, it is found, that whatever tends to encrease the fluid secretions, hastens very much the recovery of the scorbutic patient. I have seen a very striking proof of this in the effects of a spontaneous diarrhœa; for I have observed those hard livid swellings on the legs, that form one of the most constant symptoms of this disease, almost disappear, and the hams,

from being contracted, become flexible in the course of twelve hours after the purging came on. I have endeavoured to imitate this with hydragogue purgatives, such as jalap combined with cream of tartar, but never with the same effect as the natural looseness. A free flow of urine is also found to promote recovery, and vinegar of squills is one of the most effectual medicines in this intention. Spruce beer has been found a very efficacious preventive, and cure of this disease, and it probably acts not only as a fermented liquor, containing a large quantity of carbonic acid, but by the diuretic effect of the essence of spruce.

Medicines exciting sweat have also been found of service. It has already been remarked, that an obstruction of perspiration is one of the principal constituents of the disease, and the goose skin, as it is called, which is an early and constant symptom, seems to be owing to a constriction of the exhalant vessels. The sudorific medicine, called \* Dover's Powder, has been employed with advantage, with decoction of

\* The *pulvis ipecacuanæ compositus* of the last London Dispensatory.



the woods drank warm, and plentiful warm dilution. Camphor, combined with nitre, has been found one of the best remedies, and it acts both as a sudorific and diuretic \*.

Such external medicines as relax the skin, are found also to forward the cure. The contraction of the hams, the livor and hardness of the calves of the legs, are removed by emollient cataplasms. Burying the legs in the earth has a good effect, and seems to act on the same principle, for it makes the part sweat profusely in a hot climate, as I was informed by Mr. Stokoe, surgeon of the *Vengeance*, who occasionally employed this method of relieving the scorbutic men.

\* A new remedy has lately been recommended by Mr. David Paterfon, a surgeon in the navy. It consists of vinegar and nitre given together. He asserted the efficacy of it in such strong terms as a cure for scurvy, even when men were upon sea diet, that his account of it was printed by the commissioners for sick and wounded seamen, and distributed to the surgeons of the navy. Several favourable reports have been made of its efficacy, but some others have been unfavourable. It seems to be the best remedy merely medicinal, next to lemon juice, to which nothing can in the least be compared; but as it cannot always be procured in sufficient quantity, it is proper that medicines, though of inferior efficacy, should be made known.

The

The mere living on shore has a great effect in expediting recovery, inasmuch that I have known men under tents in unfrequented islands, recover with very little change of diet. This depends most probably on the effect of novelty and recreation on the mind, and seems a proof among others, that it is a disease consisting in a torpor of the living fibre, rather than a morbid state of the fluids \*.

\* This reminds me, that it may be here objected, that I have not entered into the theory of this disease. I shall shortly state what occurs to me as the most plausible account of what is called the proximate cause of this disease, and the *modus operandi* of its remedies.

From the preceding description of the symptoms and morbid appearances, this disease seems to consist in a defect of the living tone, and irritability of the fibres in general, particularly those of the vascular system; and also a diminution of their simple elasticity and cohesion. The general languor and debility, the tendency to distension, and rupture in the vessels, indicated by the *error loci*, the sanguineous and serous effusions giving occasion to the various discolorations of the skin, and the several congestions that have been described, the dilatation of the heart, the sluggish circulation, and the stagnation of the fluids in the extreme vessels, are circumstances which all concur in suggesting the cause that has been assigned.

The unnatural diet and other causes which induce this disease, seem to operate by a want of that excitement which is necessary to the healthy action of the ves-

fels, both through the medium of the stomach, as an organ of universal sympathy, and by producing vitiated fluids.

The operation of lemon juice will therefore be to excite the energy of the living fibres, more particularly the extreme vessels and absorbents, in the same manner as these last are acted upon by hydragogue purges, which excite absorption in case of anasarcaous swellings of the extremities, without being *materially* present there; but in consequence of impressions on the stomach and bowels.

The knowledge of absorption, as a power in the animal system, is daily extending itself. Mr. J. Hunter has shewn, that it is a necessary agent in growth, as all the solid parts must be removed by it, in order to give place for the formation of organs on a larger scale \*. It is proved by a process of reasoning, founded on observation and experiment, that most if not all the organs of the body undergo more or less renewal by the same means, even in an adult state; so that probably one of the principal morbid changes in scurvy, consists in the want of this salutary renewal, and the operation of its remedies consists in the restoration of it, by re-animating the circulating and absorbent vessels.

Lemon juice, considered in this view, may be deemed a *medicine*; but, on the other hand, as there can be no doubt that the fluids are more or less depraved by the putrescent and alcalescent diet, the chemical correction of these must be ascribed to it as a *dietetic* modifying the alimentary matter.

I am glad thus to escape from the slippery paths of theory, having no great confidence in the accuracy, nor conviction

\* See some new illustrations of the application of the doctrines of absorption to pathology, and the operation of medicines, in the second volume of a work, entitled, *Zoonomia*, by Dr. Erasmus Darwin.

## C H A P. IV.

## Of ULCERS.

THERE is no complaint more hurtful to the public service by sea and land, nor more afflicting to the individual, than ulcers. The legs are the chief seat of those which are so destructive to soldiers and sailors. This seems to arise, not only from these parts being more exposed to injury, but from their possessing more imperfect powers of restoration, in consequence of their distance from the centre of circulation,

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conviction of the utility of such speculations. It seems at least, in this case, to illustrate the various views which may be taken of the efficacy of the remedy in question, and to shew how far it not only surpasses every other remedy in this disease, but every other commonly reputed a specific in any other disease, while it has further the singular advantage of being a certain preventive.



tion, and from the incumbent weight and languid motion of the fluids, in consequence of gravitation. In confirmation of this \* it has been ascertained, by an arithmetical comparison, that tall men are most subject to ulcers.

Those engaged in the public service are more liable to them than others, from the hardships of service, the intemperance of weather and climate, the nature of their aliment, infection from each other, and not unfrequently from their own endeavours to excite or aggravate them by irritating applications, with a view to get rid of the service.

Seamen being more particularly exposed to some of these causes, the cure of ulcers is one of the most important branches of practice in the sea service, inasmuch as they constitute some of the most frequent, tedious, and painful diseases incident to a seafaring life; and not only distress the service by a temporary loss of hands, but are the

\* This is a remark of Mr. Home's, in his Practical Observations on Ulcers, on the authority of Dr. Young, physician to the army.

most common cause of the final and entire loss of men, after a long series of expence, trouble and inconvenience.

Though I am, in some respects, but ill qualified for treating this subject, as the immediate care of such cases did not lie in my department, yet as a treatise on the diseases incident to seamen would be imperfect without comprehending this subject, and having had opportunities in my public situations, from observation and conversation, as well as from the examination of surgeons returns and journals, of gaining information concerning it, I think it my duty to communicate to the public what I have learnt on a matter of so great importance. This I shall do as concisely as possible; confining my attention to that species of ulcer occurring in the sea service, referring the reader for farther information to a \* work lately published, in which the author displays much accuracy in his reasoning on the nature and distinction of ulcers, as well as great judgment in

\* *Practical Observations on the Treatment of Ulcers of the Legs, considered as a Branch of Military Surgery.* By Everard Home, Esq; F.R.S. surgeon to the army, and St. George's hospital. London 1797.

their treatment, as far as I am capable of judging.

It is found, from direful and multiplied experience, that not only those who are affected with actual symptoms of scurvy, but those who are exposed to the causes of it, and whose constitution is in such a train as to fall into it, are peculiarly susceptible of ulcers of the most malignant kind, from the smallest injury which breaks the skin. This might naturally be expected, from what has been said of the great debility of the fibres, and the deficiency of the powers of renovation and nutrition in this disease.

The characteristic symptoms of such ulcers, are, a thin fetid discharge, commonly mixed with blood, which sometimes coagulates on the surface. The ulcerated surface is soft and spongy, generally elevated above the level of the surrounding skin, particularly about the edges, where there are excrescences of luxuriant flesh, which, in the more advanced state of the ulcer, shoots into a soft bloody *fungus*, called by the sailors *bullocks liver*.

Besides

Besides the diet peculiar to a sea-faring life, I have now to mention another circumstance, which has not been much attended to, though it has greatly favoured the spreading of ulcers in ships of war.

From observing, in the late war, that some ships were much more subject than others to ulcers, though in the same circumstances in point of climate, victualling, and the duties of service, I was led to an opinion of their being infectious. Some facts that have occurred in this war, have put this beyond all doubt.

From what has \* already been said respecting infection, it seems difficult to ascertain what diseases may be the subjects of it. It would appear that there is a tendency in all morbid secretions, whether fixt or volatile, to stimulate similar parts in other subjects of the same species, to a like action, and to a production of the like matter. As a certain concurrence of circumstances is necessary to render any disease whatever contagious, there may be some that are so rarely so, as not to be considered

\* See pages 214 & seq. and 270.



as at all of this nature. The doubts that have arisen concerning the existence of almost every contagion \*, have proceeded from its being observed, that no contagion or infection whatever affects every person indiscriminately, who is exposed to it, and that it does not take effect, except under a concurrence of certain circumstances of constitution, habits of life, air, and other undefinable particulars, all and each of which are indispensable in bringing about the effect. A number of delicate and accidental coincidences being necessary to constitute these conjunctures, and the application of infectious matter being only one of these, it is evident how it comes to pass that numbers who are exposed are not affected, and how certain diseases may not be at all infectious, except in circumstances which but rarely occur. Dr. Lind has brought together a number of † facts, from which it is difficult to deny, that the sea scurvy itself may not sometimes be so; and proofs in favour of the same have occurred in my ser-

\* See page 217.

† See Treatise on the Scurvy, page 271, third edition.

vice \*. Judging from a gross view of the nature and history of this disease, we should be apt, *a priori*, to reject the possibility of this. But it seems extremely unphilosophical to deny the reality or possibility of any thing in nature, from our supposed knowledge of the means and causes she employs, particularly in a branch of science so obscure as the animal œconomy. Could we therefore prove the point as a matter of fact, it would be in vain to controvert it upon arguments derived from our fancied acquaintance with nature's modes of operation.

With regard to ulcers, however, this objection does not apply; for it is evident, from the *factor* they diffuse, that there is a sufficient quantity of effluvia afloat in the air to serve as matter of infection, and to leave no difficulty in conceiving how it may be conveyed and applied.

The truth of this position will best be evinced, by bringing in proof of it, a few facts out of many that might be adduced to the same effect.

\* See page 96.

The *Ganges*, of seventy-four guns, and six hundred men, arrived from the West Indies in the month of October 1796, with a great many foul ulcers on board, to which the crew had been subject for several months before leaving the West Indies. She was for some time at Spithead, under the use of fresh provisions, and again at Yarmouth, but the ulcers continued to multiply. She sailed on a cruize to the North Sea on the 2d of June 1798, with only two ulcers on board. During this cruize they prevailed more than ever; and as a proof that this was owing to infection, and not to a constitution depraved by sea diet, the surgeon remarked, that the new raised men taken on board at Yarmouth (of whom a great number were necessary, in order to replace those disabled by ulcers) were much more liable to them than the old seamen from the West Indies. This complaint continued till January 1798. It then ceased; and the means which seemed to have the principal share in putting a stop to it, were the sending every case to the hospital as soon as it appeared, a strict attention to cleanliness, and a supply of vegetables. From the arrival of this ship in England till this time, two hundred and eighteen

eighteen cases of ulcers were sent to different hospitals.

The propensity to this complaint was such, that the smallest sore, whether from a hurt or a pimple, fell into the state of an ulcer. Blistered parts also were affected in the same manner. Sores, which seemed to be in a healing state, would suddenly become gangrenous. A black speck in the middle was the constant forerunner of this.

The men who slept near the ulcered patients, were most apt to be seized with them; as also the centinels and nurses who were about them. The incisions of those who underwent surgical operations, and were placed among them, assumed the same ulcerous state; while those who were placed in a remote part of the ship healed in a kindly manner.

Those ulcers were attended with symptoms of the most virulent and malignant kind. They began with violent inflammation, which suddenly terminated in mortification; destroying in a short time the fleshy parts,



parts, so as to expose the bone, which soon became carious. They had all the characters of the worst sort of scorbutic ulcers, but they took place in constitutions in which there was no other symptom of scurvy, nor did they yield to lemon juice \*.

The *Triumph*, of seventy-four guns, and six hundred and fifty men, had been employed during the greater part of the war on the coasts of Great Britain and Ireland. During summer and autumn 1798, she was chiefly employed in cruising on the coast of Ireland; and in that time the crew was subject to malignant ulcers. Eighty-four were put on the sick list from May to December, both months included. Not only wounds and blisters fell into the ulcerated state, but a scratch or boil, and the orifice of the arm after bleeding, were subject to the same accident. Sores, which seemed to be in a healing state, would suddenly, and without any visible cause, spread again, and become foul and bloody, extremely painful, and resisting every means of cure. This unfa-

\* This account is taken from the journal of Mr. Duncan Macarthur, surgeon of that ship.

yourable change always began, as in the Ganges, with a black spot in the middle of the ulcer, a symptom which seems peculiar to this infectious sort. The manner in which they begin, is also characteristic of their nature. The surgeon of the *Triumph* agrees with the other gentlemen, in describing their beginning as attended with violent local inflammation, great heat, and a full and strong pulse for several days \*.

An incident occurred, about two months after the men belonging to the *Triumph* had been sent to the hospital ship at Cork, which affords a farther proof of their infectious nature. Twenty-seven of these men were sent from thence as invalids to Plymouth, in the \* *Atalanta* sloop of war. The same sort of ulcer spread among the crew of this sloop, seven of whom were affected with it during the passage.

Ulcers of the same kind prevailed to the most dreadful degree in the ships serving at

\* This account is taken from the journal and letter of Mr. Thomas Moffat, surgeon of this ship.

† Weekly report of that ship, 8th December 1798, by Mr. Arthur French,

the Cape of Good Hope, and the naval hospital there, in the years 1796 and 1797, producing the most severe and protracted sufferings, terminating frequently in the loss of limbs or life, or both. Nor were they confined to the lower extremities, so that the *ossa ilium*, the *scapula*, and *cranium*, would sometimes become carious. Their description is the same as has already been given; but in addition to the symptoms already enumerated, the lymphatic glands in the ham and groin sometimes swelled; the buboes in the latter suppurated, and they not only healed kindly, but the ulcers of the legs looked better while this suppuration continued \*. These ulcers were much more prevalent in some ships than in others; and they did not arise in any of them on their first arrival, at a time when the men were most highly scorbutic, but some weeks afterwards, though they had the advantage of the refreshments of the country; and they could, in some instances, be traced from the

\* These facts are taken from a letter of Mr. M'Allum, surgeon to the hospital.

intercourse of one † ship with another. I was informed by the surgeon of one of the ships of the line on that station, that some men having been sent from thence to the hospital for the cure of other complaints, they were seized with malignant ulcers originating from scratches or slight sores; although no ulcers of that description prevailed on board of the ship at that time, and although the men had the advantage of fresh and vegetable diet at the hospital. These circumstances are all in favour of their proceeding from infection, and not from climate, nor any thing peculiar in the circumstances of the service on that station.

It became frequently necessary to amputate at this hospital; and it was observed, that if the patients who underwent the operation, remained in the wards with the ulcers, few survived, owing to the gangrenous and ulcerous state of the stumps; but when

† Two bad ulcers, which were on board of the *Trusty* of 50 guns, when she arrived at the Cape, were soon afterwards cured; and the bad ulcers first appeared again in some men, upon their return from a ship to which they had been lent.

they



they were carried into a separate apartment, there were very few of them who did not recover.

It was observed, both in the ships and at the hospitals, where this species of ulcer prevailed, that the hands of those who dressed them, when the skin was broke, fell into the same sort of ulcer.

The contagious matter of ulcers, like all other infections, stimulates those parts only which are similar to those of the subject which produced it. Except therefore where the matter or effluvia lights on a suppurating surface, it does not appear that it proves at all noxious to health. It cannot fail of being drawn into the lungs, or swallowed with the saliva, yet no bad effect ensues; for many ships companies, affected with this complaint, were extremely healthy in all other respects.

It resembles the specific infections, producing febrile complaints, in this respect, that the parts become insensible to it after a certain time, like the small-pox, for they take on a healing disposition; but it differs  
from

from them in this respect, that after a certain time these parts recover their sensibility to its action, and again fall suddenly into the foul spreading gangrenous state, as is mentioned in all the accounts of this complaint.

Whether this infection depends in all cases on a concentrated state of the effluvia of scorbutic ulcers, or if it is generated by the peculiar disposition of individual cases, is a question I am not able to resolve; but I hope its history has been sufficiently investigated, to lead to some valuable practical inferences with regard to the prevention and cure of these ulcers.

### OF the PREVENTION of MALIGNANT ULCERS.

1. As seamen are extremely neglectful of themselves, and as it is of more consequence in this than perhaps any other complaint, to watch the first beginnings of it, the utmost care should be taken to find out such men as have small sores from hurts or otherwise, in order that they may be cured before they fall into the state of ulcers. This

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should

should be one of the principal objects in the reviews of the ship's company, recommended to be made by the surgeon \*.

2. As the peculiar susceptibility of sailors to this complaint, in the first instance, is no doubt owing chiefly to their diet; they ought to live on fresh provisions and vegetables, as much as the nature of the service will allow; and in long cruises and voyages, where these cannot be procured, there ought to be an ample supply of lemon juice.

3. The parts liable to them should be properly defended and supported. Shoes and stockings should be considered as necessary articles of seamen's clothing. Independent of defence, whatever compresses and supports soft parts, has been found to prevent ulcers. In the army, those soldiers who wear gaiters are much less subject to them than others. For the like reason, in order to prevent the relapse of cases nearly recovered, either a tight bandage, or something to buckle or button on the part, is a very useful precaution. It is probably

\* See page 241.

owing to the natural tension of the integuments, that the soles of the feet, though so much exposed, are very seldom the seat of ulcers, and that they are easily cured when they do arise.

4. In so far as respects this species of infection, the same means ought to be employed to eradicate it, as has been recommended with regard to the infection of fever\*. I have brought together such arguments in proof of the infectious nature of ulcers, as, I apprehend, are incontrovertible; and my anxiety on this point has proceeded from a conviction of the great importance of establishing this, with a view both to prevention and cure, and from being persuaded that some of the most important means of prevention and cure have been overlooked, from the subject not having been considered in this light. In both points of view, the primary objects of attention are, ventilation, cleanliness, and separation. It is very rarely that this infection exists but in large ships, or in the wards of hospitals, where there are a considerable

\* See Part II. Sect. iii.



number in one apartment, producing a concentrated effluvia; and the most important point is, that there should be as few as possible within each others atmosphere. Every possible effort should be made to thin and separate such cases, by not bringing them together into one part of a ship, and by dispersing them in separate apartments at an hospital, sending them to private quarters, or even putting them under tents. It was observable, that some cases of this kind did better in tents in the island of Madagascar, under all the inconveniences of these temporary accommodations, than in the regular and well appointed hospital at the Cape of Good Hope.

Another useful precaution, founded on their being infectious, is, that the utmost care should be taken not to convey any of the infectious matter from a foul sore to a clean one, by the hands of the dresser, or the instruments, utensils, or dressings they employ. A small recent clean wound has been known to fall into the state of a foul ulcer, by being washed with the same sponge which had been used to an ulcer of that description.

Of

## Of the TREATMENT of MALIGNANT ULCERS.

The remedies for scorbutic ulcers may be ranked under the heads of air, diet, exercise, internal medicines, and external treatment.

The necessity of pure air toward the cure of severe accidents, and the success of capital operations, has already been strongly stated \*. But in addition to the general expediency of ventilation and cleanliness, in promoting healthy suppuration and cicatrification, there is in the present case a specific infection to be counteracted, which it is here peculiarly requisite to do, inasmuch as this not only spreads the disease, in common with other infectious matter, but retards the cure, and keeps up the malignity of the complaint. What has been said therefore under the head of prevention, regarding cleanliness, ventilation, and the separation of the sick, is equally applicable here, and cannot be too often repeated and in-

\* See page 177.

culcated. It has indeed appeared clearly from the preceding history of these ulcers, that to attempt the cure of them without pure air, is like building without a foundation; for all other means without this, are either ineffectual, or afford only a temporary and precarious relief. We have seen, that after all that skill and attention could do in the Ganges and Triumph, and in the hospital at the Cape, the whole labour was frequently lost by sudden relapses, from the sores being continually exposed to each others effluvia.

As the scorbutic habit which renders ulcers so malignant, is contracted chiefly by sea diet, it is obvious that fresh vegetables, and particularly the acid juices so often mentioned, will be essentially necessary to their cure. In those cases, however, which are infectious, this change of diet will not effect a cure, as was found at the hospital at the \* Cape of Good Hope, as well as other places, where their malignity continued after the long and free use of vegetables and fruits. However essential, there-

\* Letter from Mr. M'Callum, surgeon to that hospital, dated 1st June 1797.

fore, fresh and vegetable diet may be, pure air procured by ventilation, cleanliness, and separation, are still more so.

The next head in the enumeration of the means of cure, is exercise. In this there is some difference of opinion among practitioners of experience; some recommending the confinement of patients with ulcers to their beds, while others recommend exercise in the open air. It would seem that the former are right with regard to ulcers, in what may be called their acute stage, while spreading, and in a state of high inflammation; while the method of the latter seems adviseable in the stationary or convalescent state of them. It is more particularly adviseable in the method of treating ulcers, invented by Mr. Bainton, and to be described hereafter. There can be no doubt that this must be of advantage, in so far as it is conducive to general health, and in so far as it withdraws the patient from the atmosphere of others labouring under the same indisposition; but whether the whole benefit depends on this, or whether a certain degree of motion is salutary to the part, is difficult to determine. Mr. Home



remarks, that those cures are more permanent which are effected under the use of exercise.

With regard to internal remedies, the most judicious practitioners in the navy are of opinion, that lemon juice, bark, and opium, have been found to possess the greatest power over ulcers. In the inflammatory stage, which has been described, they think that though there is a gangrenous tendency, yet that rich nutriment, wine, bark, and all tonics as well as cordials, are pernicious, excepting opium, and that an antiphlogistic plan of treatment answers best in this acute state. When the feverish state has subsided, these means are then admissible. In ill-conditioned ulcers in general, opium has been found superior to bark in producing a disposition to heal, and in converting the thin ichorous discharge into a healthy suppuration, which it probably does by suspending irritation and pain, and perhaps by promoting that absorption by which good pus is thickened. Opium may therefore be considered as the most valuable of all the means which are purely medicinal. The employment of it not only  
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as a palliative for the temporary removal of pain, which used to be considered as its only use, but as a powerful means of correcting the worst disposed ulcers, and even of counteracting gangrene in some cases, by a continued and free administration of it, is one of the principal improvements in modern practice. This is conspicuous, not only in the ulcers in question, but in the phagedenic buboes, which are almost the only fatal termination of the venereal disease, for these are so much under the controul of opium, as seldom to be found incurable and mortal where it is properly employed.

It is necessary again to repeat here, that in the infectious ulcers existing independently of scurvy or the causes of scurvy, both diet and internal medicine seem to be of little service, and the cure rests entirely on the dissipation of infectious effluvia, or the removal from it, and upon local treatment, which is the only part of the subject now to be considered.

I shall therefore enumerate the external applications which have been recommended by the best modern practitioners,  
and

and which have been found most successful in the navy. In doing this, I shall follow Mr. Home's method of classing them into those in the form of vapour, those in a fluid form or moist state, those in the form of powder, and those in the form of ointment. Lastly, the method of cure by mechanical compression will be adverted to.

It is proper to premise, that Mr. Home classes ulcers into those in which the action of the parts are too violent, those which have an acquired irritability, and those attended with indolence, and refers scorbutic ulcers to the last. These cannot be said to be indolent, according to the strict import of the word, since they are attended with great pain; but the epithet is sufficiently proper, in so far as those ulcers are obstinate and stationary, and require strong *stimuli* to excite in them a healthy action, by producing good granulations, while mild and soothing applications are of no service, or even aggravate the symptoms. This observation is made both by Mr. Home, and by the navy surgeons, particularly by Dr. Pattison, who has for the last two years had the charge of the naval hospital at the Cape of Good Hope.

I. The applications in the form of vapour are fomentations, or the nitrous vapour. The former consist either of plain water, or the decoction of certain herbs, such as chamomile, southernwood, wormwood, laurel leaves, or \* hops. Though these ulcers are denominated indolent, they are sometimes in a temporary state of irritability, as in their recent and spreading state, or when they have suffered any accidental irritation from fatigue or otherwise. On such occasions fomentations are proper; and when the pain is great, a decoction of poppy heads, mixed with an equal proportion of proof spirit, is often of service.

I was extremely sanguine, in thinking that the nitrous vapour, which was introduced into use by Dr. Carmichael Smyth, as a destroyer of infection, would be useful in destroying this infection; but though it was found to remove the fætor, it does not appear to have had any effect in extinguishing the infection itself. A very fair trial of it was made in the Triumph, but without ef-

\* The hops, employed as a cataplasin, have been found of service at Plymouth hospital.



fect. It was next thought of as an immediate application to ulcers; and Mr. David Paterfon, surgeon to prisoners of war at Forton, transmitted an account of the trials he had made with this view, which were so much in its favour, that it was printed and distributed in the ships and hospitals. The majority of the trials that were made in consequence of this, did not confirm what was alledged by Mr. Paterfon; who might naturally enough ascribe to this cause effects which were in great measure owing to the diet, air, and general good treatment, which could not fail to have a beneficial influence on men who had been long at sea, or from a warm climate. I am inclined, however, to think, that the bad effects remarked by some surgeons, might be owing to its being applied in a state too acrimonious and concentrated, and that a more mild and judicious use of it may still be found useful in certain situations.

2. Under the head of applications in a watry state, are comprehended poultices. These being only as it were a more continued fomentation, are proper only in the cases where fomentations were said to be useful;

useful; and may be made of the same fluids along with oatmeal. These applications are soothing and defensive, and imbibe the ichorous discharge which would otherwise irritate the neighbouring parts. It is found absolutely necessary in warm climates to renew them twice a day, when the discharge is copious and putrid. Cassada, linseed meal, raw potatoes, carrots, and turnips, have all been found useful materials for poultices. Oatmeal, in a state of beginning acidity, or mixed with the grounds of beer, has been found serviceable in taking off fœtor, and disposing ulcers to heal.

Warm applications have been found to be hurtful in the acute and gangrenous state of ulcers, according to the testimony of several of the surgeons of the ships and hospitals. Mr. Home is also of this opinion. They were therefore applied cold, either plain or sprinkled with saturnine solutions, or vinegar and water, or lemon juice, which has been found superior to most other detergents in this species of ulcers, particularly in tropical climates. Saturnine applications are not so well adapted to this, as to some other sort of ulcers, and  
are

are besides apt to produce the lead cholic \*. Mr. Home advises to lay aside poultices, when granulations begin to form.

A very dilute solution of the *argentum nitratum*, or lunar caustic, has been found useful in modern practice as a detergent in ulcers of this kind. There are some cases, in which a similar solution of *cupprum vitriolatum* is serviceable.

The *succus gastricus* of cattle, was found of great service by \* Dr. Harness, physician to the fleet in the Mediterranean. It is not favourably spoken of by those who have made trial of it in other parts of the

\* The following is an extract of a letter from Dr. Pattison, dated Cape of Good Hope, 1st July 1797:  
 “ Red precipitate to be used twice a-day; until the putrid sloughs have cast off. A compress of linen, wet with vitriolic or camphorated saturnine water to be applied, properly supported by a flannel roller. When the ulcer is clean, and the discharge good, dry lint may be used, or now and then moistened in lime juice. Slips of cerate to be applied round the edges. The compress to be wet three times a-day, and the roller to be soaked in *acetum camphoratum*, before it is applied.”

\* See Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol. II.

world.

world. They alledge it is too stimulant. But Mr. Home has experienced the most unequivocal good effects from it at St. George's hospital, and it seems deserving of further trials in the navy.

Tincture of myrrh is recommended as an application to ulcers of this kind, by some of the most experienced practitioners.

Mr. Home mentions, on his own experience, the nitrous acid diluted, so as to fit it for an external application, as a very useful medicine. The sensible effect of it is to coagulate the *pus*, and form a crust, under which the granulations are formed. It does not answer when the ulcer is in an irritable state, as it then aggravates it and makes it spread.

In so far as I know, this practice is not known in the navy, but is certainly deserving of a trial. While I was physician to St. Thomas hospital, it was found that the muriatic acid used in this manner to cancers, took off entirely the fœtor so offensive to the patient, and those in the same apartment, and retarded the progress of the complaint,



complaint, but it was not found to have this effect in foul ulcers of a different kind.

The purpose of specifying so great a variety of applications under this and other heads, consists not only in suggesting applications suited to the varieties of constitutions and cases, but in affording a succession of them ; for it is found, that any one application loses its effect by its use being long continued.

3. The third form of application is that of powders. Several surgeons of the fleet, as well as Mr. Home, have found great advantage from charcoal in this form. Extract of opium, mixed with an equal quantity of some other powder, such as linseed meal, has been found to have a good effect in certain ulcers. Rhubarb \*, in the same form, is very favourably spoken of by several surgeons of the fleet. Peruvian bark

\* This was first proposed by Mr. Home, in a paper in the first volume of Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge. Vol. I. London 1793.

has been used with success in the same manner.

But the application in this form, which has been found by far the most useful in foul ulcers, even in their acute and spreading state, is the red precipitate, or *hydrargirus nitratus ruber*. Mr. Home recommends that it be only occasionally applied, unless it is rendered less active by being intimately mixed in different proportions with some inert powders\*.

4. The next form of application is that of ointment. Mr. Home thinks unctuous applications better adapted to this species of ulcer than any other. They require the addition of some stimulating ingredient, such as the salts of mercury. The *ungentum hydrargyri nitrati* mixed with the *adeps suilla* in different proportions, is one of the best applications, and Mr. Home thinks it has more power in producing healthy granulations, and in removing the thickened

\* I do not find that the *ærugeo æris* has been tried in these ulcers. As it is a powerful detergent and escharotic, of long established character, it seems to be deserving of a trial.

edges of ulcers, than any other applications.

The ointments are themselves sometimes composed of acrid ingredients, such as the *resina flava* or gum elemi, or they are mixed with the red precipitate in the proportion of a drachm to an ounce, more or less according to circumstances.

Camphor, mixed with the *unguentum album*, answers in some varieties of this ulcer.

Mr. Brown of the Royal Sovereign found advantage in some foul ulcers from an ointment composed of two scruples of calomel, and one ounce of *unguentum picis*.

5. The last mode of external treatment is that by mechanical compression. Rollers, tight bandages, and laced stockings, have long been in use as good auxiliaries in the cure of obstinate ulcers; but there is a method of cure upon this principle lately thought of by Mr. Bainton of Bristol, which has been found far superior to any other upon this or any other principle.

The

The mode of executing it is transcribed \* below from the second edition of Mr. Bainton's publication, a work with which every practical surgeon should be provided.

It

\* " The parts should be first cleared of the hair sometimes found in considerable quantity on the legs, by means of a razor, that none of the discharges, by being retained, may become acrid and inflame the skin, and that the dressings may be removed with ease at each time of their renewal, which in some cases, where the discharges are very profuse, and the ulcers very irritable, may perhaps be necessary twice in the twenty-four hours, but which I have in every instance been under the necessity of performing only once in that space of time.

" The plaister should be prepared by slowly melting in an iron ladle a sufficient quantity of litharge plaister or diachylon, which if too brittle when cold to adhere, may be rendered adhesive, by melting half a drachm of rosin with every ounce of the plaister. When melted, it should be stirred till it begins to cool, and then spread thinly upon slips of smooth porous calico of a convenient length and breadth, by sweeping it quickly from the end held by the left hand of the person who spreads it, to the other held firmly by another person, with the common elastic spatula used by apothecaries. The uneven edges must be taken off, and the pieces cut into slips about two inches in breadth, and of a length that will, after being passed round the limb, leave an end of about four or five inches. The middle of the piece so prepared, is to be applied to the sound part of the limb opposite the inferior part of the ulcer, so that the lower edge of the plaister may be placed about an inch below the lower



It is considered as a very judicious and ingenious practice, and extensive experience has already ascertained the great utility of

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edge of the fore, and the ends drawn over the ulcer with as much gradual extension as the patient can well bear. Other slips are to be secured in the same way, each above and in contact with the other, until the whole surface of the fore and the limb are completely covered at least one inch below, and two or three above the diseased part.

“The whole of the leg should then be equally defended with pieces of soft calico three or four times doubled, and a bandage of the same about three inches in breadth, and four or five yards in length, or rather as much as will be sufficient to support the limb from the toes to the knee, should be applied as smoothly as can be possibly performed by the surgeon, and with as much firmness as can be borne by the patient, being passed first round the leg at the ankle joint, then as many times round the foot as will cover and support every part of it except the toes, and afterwards up the limb till it reaches the knee, observing, that each turn of the bandage should have its lower edge so placed as to be an inch above the lower edge of the fold next below. If the parts be much inflamed, or the discharges very profuse, they should be well moistened and kept cool with cold spring water poured upon them, as often as the heat may indicate to be necessary, or perhaps at least once every hour. The patient may take what exercise he pleases, and it will be always found that an alleviation of his pain, and the promotion of his cure, will follow as its consequence, though under other modes of treating the disease it aggravates the pain and prevents the cure.”

it.

it. It does not answer in the recent inflammatory and spreading state of scorbutic and infectious ulcers, nor in venereal, carious, nor cancerous cases. But in other cases there are ample testimonies of its success, from some of the most reputable \* surgeons of the fleet, and from the surgeons of the hospitals at Plymouth and Norman Cross, and it is a method daily gaining ground both in public and private practice.

There are two remedies which are not referrible to any of the classes above mentioned, the cold bath, and change of climate. The first has been found of sensible benefit in the opinion of several medical men of accurate observation. With regard to

\* Mr. Brodie of the Atlas, Mr. Brown of the Royal George and Royal Sovereign, Mr. Jarvis of the Culoden, Mr. Magrath of the Ruffel, Mr. Fuge of Plymouth hospital, and Mr. Magennis, surgeon to prisoners of war at Norman Cross, all concur in recommending this practice from their own experience. The last mentioned gentleman communicated to the Medical Board of the navy such a clear and satisfactory account of its success, that they caused it to be printed, and transmitted copies of it to all the naval hospitals and ships in commission, in order to diffuse the knowledge of this excellent practice.

change of climate, though we have seen the malignant ulcers prevail in ships which never had been in a hot climate from their being commissioned, and although the ulcers have prevailed in them with equal malignity in the winter season, it is nevertheless true, that the bad ulcers which broke out in the West-Indies are greatly benefited by a change to a temperate climate.

## C H A P. V.

Of various CASUALTIES: DROWNING—  
SUFFOCATION — POISON — INTOXICA-  
TION—COLD—BURNS, &c.

EVERY humane and conscientious member of the medical profession, will feel it as a matter of duty to furnish himself with the knowledge requisite for counteracting these accidents, and to carry constantly in his mind the methods of giving relief in cases which do not admit of long deliberation, nor of employing much time in consulting authors, or procuring the assistance of farther advice.

As most of these accidents are uncommonly incident to a sea life, a concise account of the most approved means of counteracting them, will, I apprehend be considered, as a proper article of this work.

I. Accidental submersion in cold water is the most frequent of these, and the first

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object in such cases is to restore warmth. With a view to this the body should, without the least loss of time, be stripped and thoroughly dried, by rubbing it with hot cloths. In case the sun should be shining, and the climate and season will admit of it, the body may be exposed to the rays of the sun, as these will communicate a proper degree of warmth, and the exposure to the fresh air will be favourable to the return of respiration. If the weather should not allow of this, the drowned person should be carried into a well-aired apartment, where warmth should be applied to the skin by cloths heated at a fire; hot bricks or bottles filled with hot water, and wrapped in a cloth, applied to the feet; hot salt in a bag, applied to the pit of the stomach; by a warm bath, or by the living body being applied to it, taking care however, that the air of the apartment be cool and pure, by the admission of fresh air, and the removal of all persons who are not necessary in the operations for restoring life.

It is almost needless to caution the reader against carrying to excess certain pernicious practices,

practices, founded on the opinion that the sole cause of death consists in water being taken into the body, either by the stomach or lungs. This consideration, however, is not entirely to be overlooked, for it has been found by\* experiments with tinged liquors, that some part of the fluid medium gets into the lungs, and it is perhaps owing to this that submersion destroys life in a shorter time than strangulation, as I have ascertained by experiment. It will be proper at any rate, as soon after the accident as possible, to put the body for a short time in such a position that the water may drain, if not from the lungs at least from the *fauces*, in order that it may not embarrass respiration in case it should return.

It is almost equally needless to inform the regular practitioner, that the suspension or extinction of life depends on the inhalation of vital air being interrupted by the submersion, and that all the means of recovery ought to have in view the restoration of respiration. Vital air, in contact with the air vessels of the lungs, being that † specific

\* See a work entitled *Connection of Life with Respiration*, by Dr. Goodwin.

† See *Lecture of Muscular Motion*, page 19.

stimulus upon which the action of the heart depends. For this purpose the body should be raised nearly to the sitting posture, and every effort made, as soon as possible, to bring the organs of respiration into play. This posture will be most favourable, by taking off the pressure of the intestines, which form an obstacle to the descent of the diaphragm, in which consists the principal action of life in performing inspiration. A state of death, whether real or apparent, is a state of expiration, and our endeavours to restore life should therefore, in the first instance, be directed to enlarge the cavity of the thorax, as this constitutes inspiration. Besides favouring the descent of the diaphragm therefore, an attempt should be made to imitate the rotation of the ribs, by stroking them with considerable pressure upward and a little forwards. In experiments upon animals, I found this operation conduce more than any other to the restoration of life; and this might be expected, as it is the only one which imitates Nature's method of performing respiration. The advantage gained by the erect posture is confined to the human species, this being the posture natural and

and peculiar to man. The actions of respiration will farther be favoured by alternate pressure on the sternum and abdomen, the compression of the abdominal *viscera* by the muscles of the *parietes*, being the principal means of expiration in the ordinary actions of life.

In aid of these operations the expansion of the thorax should also be attempted, by endeavouring to inflate the lungs by the nose. The air from the lungs of another person is neither so cool nor so pure as could be wished, but the efficacy of this operation is undeniable, from the frequent well attested recoveries of children, apparently dead immediately after birth, by this method; and as it is the most easily and quickly performed, it should be put in practice till an artificial apparatus for this purpose can be procured. The air by this method should also be introduced by the nose, as it will thus pass more readily behind the epiglottis than by the mouth.

In inflating the lungs, care should be taken to press the larynx backwards, in order to prevent the air from passing into the stomach by the gullet.



Among the secondary methods of restoring animation may be reckoned agitation, friction, and change of posture. The friction should be performed with hot dry cloths. Dr. Cullen recommends the spirit of sal ammoniac to be rubbed on the wrist and ankles, and the skin to be rubbed with hot spirits. These, however, should be practised with discretion, for nothing is more likely to destroy the faint remains of animation than mechanical means too roughly employed. Life has been aptly compared to a \* flame. The same means, which, when employed in a moderate degree, are well calculated to excite it, will, if violently employed, extinguish it.

These, and other means of recovery, seem to operate by their action on respiration, for all functions and actions are dependent upon each other, and have therefore a mutual influence both in suspending and exciting each others motions. With this view the play of the stomach and bowels should, if possible, be restored. Glysters have been recommended, with a view to excite the na-

\* Nutritur vento, vento restinguitur ignis,  
Lenis alit flammas, grandior aura necat.

tural action of the bowels. Tobacco smoke was first recommended for this purpose, and there are strong testimonies in its favour in the cases published in Holland illustrative of this subject. This may probably act by simple distension; and there is a case on record where merely filling the \* intestines with air from a common bellows, seemed almost instantly to restore life in a drowned child. Later writers have exploded the use of tobacco, alleging, that it is a narcotic, and therefore unfriendly to life, and propose instead of it to inject warm wine or diluted spirits, with something nourishing. The smoke of aromatic herbs or gums seem less exceptionable than that of tobacco. The liquid injections have also the advantage of being more easily and sooner procurable; but there are so many testimonies in favour of the smoke glysters, that they should not be hastily laid aside merely upon reasoning, and they are not incompatible with the others.

In case the power of swallowing shall have returned, no time should be lost in in-

\* See Collection of Authentic Cases, &c. by Alexander Johnson, M. D. London 1773.

roducing something cordial, such as warm wine, or diluted volatile alkali into the stomach. It becomes a question whether an emetic should be employed. In case the accident should have happened after a full meal, it seems proper to excite vomiting, for it is found that a large quantity of undigested victuals proves a great embarrassment to the functions of life in general, as excess of eating or indigestion, are apt to excite fits of the asthma and apoplexy. If it shall appear also from the external tumefaction of the stomach, that a large quantity of water has been swallowed, the same steps will be adviseable, for any thing bulky in the cavity of the abdomen, will necessarily obstruct the descent of the diaphragm, which, as has been said, is the principal action of respiration. The argument employed against emetics, is, that every evacuation and unnecessary exertion being lowering to the powers of life, should be avoided. But if white vitriol is employed this objection will not apply, for it not only operates speedily but easily, with little nausea, and this metallic salt has a tonic power. Half a drachm of it dissolved in two ounces of water will be a proper dose.

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The question respecting the propriety of blood-letting after accidents of this kind, seems to admit likewise of a qualified answer. Some late writers have condemned this practice in all cases. But their ideas on this and other points are deduced from theory; and though it seems highly rational to affirm, that the abstraction of blood being a means of weakening the powers of life, is a very unlikely means of restoring it, yet it has certainly been practised in some of the most successful instances of resuscitation; and in plethoric and fat subjects, it seems a very likely means of giving greater freedom to the stagnated circulation. If the face is livid, Dr. Cullen advises the opening of the jugular vein.

On the principle already mentioned, of the mutual influence of all the parts and functions, the sensibility and irritability of every portion of the body that can be come at, should be gently roused. Not only the skin therefore, and the bowels, but the Schneiderian membrane, having a natural sympathy with the organs of respiration, should be stimulated, either with a feather or the vapour of the volatile alkali; and there can  
be



be no doubt, but if some warm cordial could be introduced into the stomach before the power of swallowing is recovered, by means of a flexible tube \*, it would have an important effect in restoring the powers of life.

It is the advice of † Mr. John Hunter, that when respiration begins to return, the means used for its restoration should be slackened, for fear of overpowering the first and feeble actions of life ; and the like caution with regard to warmth, food, and cordials, seem adviseable during the progress of recovery.

2. Next to drowning, the most common accident peculiar to a life at sea is the suffocation from foul air in the hold of a ship.

The symptoms of this accident are considerably different from those attending submersion in cold water. 1st. There are

\* A contrivance of this kind is described by Mr. J. Hunter, in the first volume of Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge.

† See Philosophical Transactions, vol. 69.

cases

cases which prove fatal, in which though consciousness is lost, respiration is not stopped, as \* I myself have witnessed. 2dly. So far from the body being cold, there is a preternatural degree of heat, where the accident is recent. 3dly. There is a turgescence both of the internal and external vessels of the head.

When an accident of this kind is recent, more especially when respiration has not ceased, the external application of cold water has been found of the utmost benefit. There is a great number of well-authenticated cases on record in proof of this. It may be dashed upon the face, and even upon the whole body. Dr. Guthrie † relates, that accidents of this kind are frequent in

\* This happened in a ship in the West Indies, on board of which I was at that time on some other professional duty. Four men were rendered insensible in going down to the well. Two soon recovered. The other two died. They continued to breath till death, in the manner of a person in apoplexy. I look back with compunction at not having then in my recollection the most effectual means of restoring them, particularly the external application of cool air and cold water; and I make this confession as a warning to others, that they may be prepared for such emergencies.

† Philosoph. Transactions, vol. LXIX.

Russia, in consequence of their mode of life, and that such cases are successfully treated by exposing the body almost naked to the open air in snow.

Strong stimuli should be avoided\*. Vinegar should be applied to the nostrils, and vinegar, diluted with water, should be given by the mouth.

In consequence of the increase of heat, the additional force of the circulation, and the congestion in the head, the taking of blood from the head is indicated. This is done either by cupping or by opening the temporal artery, or jugular vein.

In cases where the accident is not so recent, so that respiration has ceased, and the body is below its natural temperature, the same means of resuscitation as those described in cases of drowning, are to be practised.

The opening of the trachea by incision, whereby to inflate the lungs, has been recommended in cases of suspended respiration, from whatever cause. There is a well

\* See Portal on Recovery from Apparent Death.

authenticated \* case of a man restored to life chiefly by this means, after being suspended in the execution of justice for twenty-nine minutes.

It sometimes happens that insensibility and apparent death is brought on by a blow or concussion, though no particular organ is materially injured. This is most likely to happen from a blow on the stomach. The use of the warm bath in such cases is perhaps one of the best means of recovery. A case † strongly in support of this is related by Dr. Alexander. A man received a blow on the breast, by which he was not only rendered insensible, but his breathing ceased. A vein was opened, which did not bleed; but soon after he was put into a warm bath, respiration began to return, blood flowed freely from the vein, and he soon entirely recovered.

There is an injury incident to seamen in battle, called the wind of a ball, more particularly to be described hereafter, which

\* See Collection of Authentic Cases before cited.

† Physical and Literary Essays, vol. III. Edinburgh, 1771.



sometimes instantaneously destroys life, without any apparent lesion of parts. The means last mentioned might be employed with a probability of success.

It is not uncommon for ships to be struck with lightning; and as the effect of it upon the animal frame is to produce palsy and coldness, cordials and stimulants, particularly external warmth, are indicated, together with the means for restoring respiration. The warm bath would probably be found beneficial. Bleeding and other means of lowering the patient should be avoided\*.

3. Accidents from † poison sometimes happen on board of ships. Most of the

\* In the spring of the year 1798, this accident happened on board of the Cambrian frigate. Two men were killed, and one apparently so, being deprived of consciousness and respiration. Friction and external warmth seemed to have the principal share in his recovery, which however was only partial, for in a year afterwards he had not recovered his speech, nor his natural strength. Several other men were struck, but less violently, having been affected with palsy in some of the extremities, from which they in time recovered.

† See page 293.

mineral

mineral poisons, such as verdigrease and corrosive sublimate, being metallic salts, are decomposable by fixed alkalis. These should be administered in a very diluted state along with sweet oil, broth, or milk. Hepar sulphuris dissolved in water, in the proportion of a drachm to a pint, is recommended by the French authors. Calcined magnesia, being free from acrimony, and being also purgative, is preferred in some cases to the alkalies.

Where mineral acids have been swallowed, the propriety of applying the same remedies is still more obvious.

The first and most obvious means of counteracting all poisons is by evacuating them by vomiting. The most speedy emetic is white vitriol, which may be given to the quantity of a drachm dissolved in a cup of warm water. In case this or any of the common emetics should not be immediately procurable, a small quantity of snuff, which can almost always be instantly procured, may be swallowed. In case the opportunity of evacuating them by vomit should be lost, an attempt should be made to expel them downwards. The purgatives that seem best

adapted for this are castor oil, and a solution of purging salts.

Where the power of deglutition is destroyed, vomiting may be excited by a cataplasm of tobacco to the pit of the stomach.

Those acrimonious poisons which act only on the living fibre, such as cantharides, are to be counteracted chiefly by milk and oil.

In those cases in which unctuous substances are adviseable, mutton suet, melted with a gentle fire, has been thought to answer better than oil.

The narcotic poisons are said, by some authors of reputation, to be best counteracted by vegetable acids.

Opium is sometimes taken secretly with a view to destroy life. A visible throbbing of the carotid arteries is a distinguishing symptom of this poison, and I once detected it by this criterion. After death has from this cause apparently taken place by a cessation of respiration, life has been known to

be restored by blowing strongly into the lungs with a bellows. It is therefore worth while in all cases to attempt this, by means similar to those described in accidents by suffocation.

Under this head intoxication may be included, ardent spirits being a narcotic poison, and very fatal accidents from it are frequently related in the journals of navy surgeons. The same means therefore are to be used even after the apparent cessation of life.

In those cases of \* poison suddenly affecting life, such as the bites of animals, and those used for poisoning weapons, the pure volatile alkali, either in the form of *aqua ammonia pura*, or *eau de luce*, has been found to have considerable reviving powers. A teaspoonful of these may be given repeatedly in water.

4. Accidents from cold may be enumerated among those incident to a sea life. In cases of frostbitten limbs, it is a precaution, the propriety of which is well esta-

\* See Asiatic Researches, vol. II. p. 323.



blished and generally known, that the part should not be suddenly exposed to heat, as this would infallibly bring on sudden mortification. This is so well known even to the vulgar in countries subject to this accident, that the first step taken gradually to restore warmth is to rub the part affected with snow.

Upon the same principle, when the whole body has been long exposed to intense cold, as in cases of shipwreck, the sudden exposure to heat, the immediate administration of strong cordials, and rich nourishment, should be avoided. All these means of restoration should be used in a moderate degree, and in a gradual manner. In applying external warmth it will be found, that much more comfort will be derived from such application being made to the pit of the stomach, than to any other part of the body.

It is of the utmost consequence, that a surgeon of the navy should make himself master of the most approved method of treating casualties from burning. It appears from the medical journals, that scalds are very common accidents, but scorches from gun-powder

powder are peculiarly incident to this service, and are productive of extreme suffering, long confinement, and great danger.

With regard to scalds, the use of vinegar was recommended in a publication some years ago by a brewer in Edinburgh, and very satisfactory evidence brought of its good effects, from his experience in the application of it to his workmen, who frequently met with these accidents, and the utility of it has been confirmed by professional practice. The part may be immersed in the vinegar, or covered with rags kept constantly wet with it.

In burns, the application best established by experience, so far as I know, is equal parts of linseed oil and lime water. At the furnaces of the Carron iron work, this remedy has been for many years preferred to all others.

In all cases of burns, whether from hot liquids or ignited bodies, ice and iced water has of late been used with great success in private practice in London. It not only prevents the severe suffering incident to recent accidents of that kind, but prevents  
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vefications, those tedious and painful ulcerations which usually follow injuries from fire.

Preparations of lead have also been found of great use in such cases, in their recent state, but they should not be long continued.

## C H A P. VI.

### Of the WOUNDS received in the Actions of April 1782.

Loss in the Battle and from Wounds—Fatality of the locked Jaw—Treatment of it—Some Ships more subject to it than others—Different from other Cases of Tetanus—It is not cured by the Removal of the Part—It may come on after the Part is cured—Effect of Climate in producing it—Accidents from the Wind of a Ball—Accidents from the Explosion of Gunpowder—Means of preventing them—General Observations on Sores and Wounds.

**T**HOUGH surgery was not properly in my department, yet having had a fair opportunity of collecting facts concerning this branch of practice, I thought it my duty to pay some attention to it.

The whole number of men wounded in the actions of April, 1782, amounted to eight hundred and ten.

Of

Of these, sixty died on board before the end of the month, five in the course of the following month, and two in June.

There were ninety-seven wounded men sent to the hospital at Port Royal, of whom there had died twenty-one when the fleet left Jamaica on the 17th of July.

So that the whole loss of men in the battles of April, and their consequences, is as follows :

Killed outright	- - - - -	266
Died of their wounds on board	- -	67
Died of their wounds at the hospital		21
		<hr/>
Total		354

Of those who died on board, fifteen were carried off with the symptoms of the locked jaw ; but of those sent to the hospital, only one. The reason that so few in proportion were affected with it in the hospital may have been, that none of the wounded were landed till near the end of the third week after the principal action. The danger of this symptom was then, in a great measure,  
past,



past, though I have known it to take place in every period from the second or third day till the fourth week,

Only three men in the whole fleet recovered from this alarming complaint; and as it is interesting to know every thing relating to so desperate a symptom, I shall give a short account of each.

The first was a seaman of the Montagu, who had his thigh wounded by a splinter, which carried away part of the integuments and *membrana adiposa*, and lacerated in a small degree the *vastus externus* muscle. The wound did extremely well till the 23d day, when the jaw became almost entirely fixed, and the whole muscles of the wounded side were thrown into frequent spasms. Mr. Young, the surgeon, who was always anxious and assiduous in his duty, consulted with me, and we had immediate recourse to the warm bath, which gave a degree of instantaneous relief, and was repeated twice a day for half an hour. He was sensibly better every time; in nine days was entirely free of the symptom, and continued afterwards to do well. The only other means taken for this man's recovery,

recovery, besides what were used with the other wounded men, were from three to five grains of opium, which he took every day, in divided doses.

The next was a seaman of thirty years of age, belonging to the *Magnificent*, who had the *humerus* broken and shattered by a splinter which entered the deltoid muscle. Several large portions of bone were extracted, and the artery was laid bare on the inside. On the fifth day there came on a large sanious discharge, with a low quick pulse and depressed spirits, and the jaws began to close, with pain and stricture on both sides about the articulation of the lower jaw. He had every day since the accident taken half an ounce of Peruvian bark, combined with opium or rhubarb, according as it made him loose or costive. This was continued, and the part externally was kept constantly moist all round with volatile liniment, to which a fourth part of *tinctura thebaica* was added. Next day the jaw was almost entirely fixed, so that it was with difficulty that a little wine and water could be introduced with a spoon. Mr. Harris, the surgeon, now wisely determining to do something vigorous in  
this

this unpromising situation, beat up twelve ounces of opium moistened to the consistence of a cataplasin with the thebaic tincture, and applied one half to each side of the jaw. The patient this day swallowed a pint of the bark decoction with half an ounce of nitre, and took a diaphoretic draught of twenty drops of thebaic tincture and thirty of antimonial wine. He had also the smoke of tobacco thrown up his nostrils.

On the third day after the attack he could open his mouth half an inch. The cataplasms were taken off, beat up afresh with the tincture, and applied anew. The bark and other medicines were continued. On the fourth day the stricture and pain of the jaw went entirely off, but the cataplasin and volatile liniment were applied for three days longer. The wound produced a laudable discharge, every symptom became favourable, and he continued to recover.

The only other person who recovered from this symptom was a man in the Bedford. Several died of it on board of this ship; and

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as the same means of relief were skilfully employed in all the cases by Mr. Wickes, the surgeon, the success seemed owing more to something favourable in the man's constitution, than any thing peculiar in the treatment, which consisted in the administration of the warm bath, opium and camphor, with mercurial friction on the jaw.

This accident affected some ships remarkably more than others, particularly the *Barfleur* and *Bedford*, though their wounds had nothing peculiar, nor were in a greater proportion than in the rest of the fleet. Four were carried off by it in each of these ships. It has formerly been observed, that great ships acquire peculiar habits, or dispositions; which incline the constitutions of the men to one disease more than another. This complaint took a run in some particular ships also after the battle of the *Chesapeake* in autumn 1781; and I have known it prevail in some particular hospitals more than others. In the present instance, it may have been owing either to something peculiar in the constitution, or air of the ships; or we can conceive it to be owing to nervous sympathy,



sympathy, just as the *epilepsy*\* has been known to spread from one boy to another, at a school, in consequence of imitation, dread, horror, or some such delicate nervous or mental affection. We have in yawning an example of a spasmodic affection spreading from one person to another. If this is the case in the locked jaw, those affected by it should be removed from the presence of the other wounded men, lest the idea of the sufferings of others should be so fixed in their mind, or so impress them with the fear of the like, as to invite the attack of the same complaint.

Though the locked jaw, in consequence of wounds, resembles frequently in its symptoms the tetanus which arises without any external accident, yet there are many cases of the former which differ materially from the violent symptoms of the other, as de-

\* See Kaau Boerhaave's account of this epilepsy in a school at Harlaem, in a book entitled, *Impetum faciens, dictum Hippocrate per corpus consentiens* (page 355.) A fact of the same kind is also related in a pamphlet, entitled, *Rapport des Commissaires chargés par le Roi de l'examen du Magnétisme Animal*. Paris 1783.

scribed by authors. In most cases of the locked jaw from wounds the spasms are not so general, so violent, nor attended with such exquisite pain. It sometimes happens that the convulsive twitchings are even accompanied with a sort of pleasure, as in the case of a lieutenant of the Montagu, whose case was related to me by Mr. Young, the surgeon of that ship, upon whose fidelity and accuracy I could perfectly rely. This officer had been wounded in the elbow at the battle of St. Christopher's by a splinter, whereby the capsular ligament of the joint was injured. On the ninth day, symptoms of the locked jaw came on, and soon after the whole muscles of the wounded side were affected with frequent convulsive twitchings, which, as he himself said, afforded a pleasant sensation, exciting laughing like an agreeable titillation. He died on the fourth day after it came on, and had no pain to the last.

It is to be remarked, that the locked jaw did not take place in those cases in which the wounds had a foul and gangrenous appearance more than others; for those that digested and cicatrized favourably, were

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equally

equally apt to be affected by it ; and though amputations are most liable to this symptom, the slightest injuries, even a scratch, will sometimes bring it on.

It would be difficult, therefore, to establish any particular treatment that would tend to prevent accidents of this kind ; but Mr. Bassan, surgeon of the *Arrogant*, one of the line-of-battle ships engaged on the 12th of April, mixed laudanum with the dressings of all the wounds, and no locked jaw occurred.

Dr. Clarke\*, of Dominica, who says, that he never saw a case of tetanus from a wound which did not prove fatal, and being anxious to devise some means of prevention, gave, from the time the wound or puncture was received, two or three grains of calomel twice a day, till a salivation came on, and dressed the part with mercurial ointment. And after operations he gave three grains of calomel every night, with a grain and a half of opium and three

\* Treatise on the Yellow Fever, and other West India diseases.

or four doses of bark in the day time, without regard to the symptomatic fever, till the mercury affected the mouth. The calomel was then given every second night, continuing the opium and bark till the fifteenth day, after which all remedies but the opium were laid aside. Out of fifteen patients, after amputations that were treated in this manner, only one died, and he had been previously in a very irritable state. Dr. Clarke adds, that the prevention of this fatal symptom in several of these cases, may fairly be imputed to the course of medicine, as the success was about three times greater than in the common practice.

In the Bedford there occurred a curious circumstance concerning this complaint. In one of the cases that proved fatal, the symptoms did not come on till the wound was so far healed that all dressing had been laid aside.

Mr. Wood, surgeon of the hospital at Jamaica, informed me, that in cases of the locked jaw from injuries to small members, such as fingers, he had tried the effect of amputating the part after the symptoms had come on, but without any effect in putting a stop to them. There are other cases in



books and surgeons journals to the same purpose, and in a paper read before the Royal Society, 7th March, 1765, and recorded in the Annual Register, 1766, a case of a woman is related who died of a locked jaw, which did not come on till the 4th day after the wound, made by a rusty nail running into the foot, had healed.

Would it not appear, from the last-mentioned facts; that this symptom is not kept up, nor even takes place in the first instance, from an immediate present irritation, but that the constitution comes to be so modified, or receives such an impulse, as it were, that the complaint runs its course independent of the presence of that *stimulus* which excites it?

It would be difficult to assign a satisfactory reason why this accident is more frequent in hot than in cold climates. External heat, even where it exceeds that of the living body, has no effect in raising its temperature\*; so that we are to seek for the effects of it in some of those affections peculiar to animal life. And as the outward tempera-

\* See experiments on a heated room. Philosophical Transactions, 1775, Vol. LXV.

ture of the air does not affect the general mass of the body, all the effects produced by it must depend on impressions made on the surface of the body and lungs; and the skin, which may be considered as a large expanded tissue of nervous fibres endowed with universal sympathy and great sensibility, affects every organ and every function of the body, according to the state of the air in contact with it, whether cold or hot, moist or dry, pure or vitiated. The same may be said of the *trachea* and *bronchiæ*. This sympathetic sensibility of the skin is chiefly affected by the state of the perspiring pores on its surface; for it is only when these are open that the impression of the air on the skin produces catarrhs, rheumatisms, and internal inflammations in cold climates; and the external temperature in hot climates being such as to keep the pores almost always open, this seems to be a principal reason of that universal irritability prevailing there, and of the general sympathy that prevails between every part, particularly as connected with the organs of perspiration\*. This readiness of one part to  
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\* That species of locked jaw, called by authors the *Trismus Infantium*, to which children are liable the first

be affected by another in hot climates, is well illustrated by the sudden translation of certain diseases. I have seen, for instance, a catarrh cease, and be converted, as it were, into a diarrhœa, and this as quickly disappearing, a pain in the foot would arise, like an attack of the gout. All this would happen in the space of a few hours.

It may here also be asked, how the muscles of the jaws come to be more affected with this symptom than those of other parts of the body. The only obvious peculiarity of the former, consists in their being, more than any other voluntary muscles, in a state of constant action, in order to prevent the lower jaw from yielding to its gravitation; and if its being more disposed to mor-

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week after birth, is probably owing to the contact of the external air with the skin, which is accustomed in the womb to a moist and warm medium.

Dr. Clarke, of Dominica, in a work before referred to, alleged, that this symptom, among the infants of the blacks, is owing to the smoke of wood fires; and he found, that when the mothers, while lying in, could be placed in a situation where they could have no fire during the first nine days, the infants were never affected with this symptom. But as this accident does not occur in the smoky hovels of cold climates, it is evident that the concurrence of heat is necessary.

bid spasm depends on this, would it not be worth while, in cases of wounds, to try the effect of tying up the jaw, as a preventive of this symptom?

The cold bath has been recommended on the authority of several practitioners\*, but the efficacy of it has been the subject of controversy. This, like many other controverted points in medicine, may be settled by discriminating those cases in which it is likely to succeed, from those in which it is not; and it is somewhat singular, that it has perhaps been as fairly appreciated by Hippocrates†, as it can be done at this hour. He alleges, that the warm bath is the remedy generally to be employed in tetanus; though there are some cases of young and robust subjects, in which the cold bath has been found to answer, but that it is not advisable in cases proceeding from wounds. A dry heat on the skin seems also to render the cold bath advisable. This was a symptom in a case described in one of the surgeons journals, in which this method of cure was employed with success. The exception mentioned by Hippocrates ought,

\* Dr. Cochrane, Dr. Wright, and Dr. Currie.

† Aphorisms, lib. v. sect. 20, 21, and 22.



however, to be admitted in a qualified degree, for some of the successful cases related by Dr. Wright proceeded from wounds, and some cases of the same kind have appeared in different publications. Mr. Haliburton, surgeon to the naval hospital at Halifax, found success in a case of locked jaw proceeding from a lacerated wound, by using the cold bath thrice a day, making five immersions each time. Opium, bark, and wine, were used besides. Mr. M'Grath, surgeon of the *Russel*, finding the warm bath not to give relief in a case not proceeding from a wound, used the cold bath every four hours with success. It is a presumption in favour of this practice, that in painful cramps in the extremities, to which some people are subject, the only relief is found from dashing cold water on the part. I am acquainted, however, with some cases, both in private and hospital practice, in which the cold bath, to all appearance, aggravated the symptoms; and it is a further argument against the indiscriminate use of it, that Dr. Clarke, of *Dominica*, says, "the cold bath has never answered with me, though I have frequently tried it."

But though wounds are much less subject to locked jaw in cold climates, they are  
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by no means exempt from this symptom; for it sometimes occurs in England, where I have seen it even in the winter season\*.

The cure, so far as my experience extends, seems to depend chiefly on the judicious employment of opium and the warm bath.

Since my return to England I have received some new and useful information on this subject in conversing with Dr. Warren, physician to the King; and as any observations derived from so much acknowledged skill and sagacity must be valuable, I shall here relate what he was so kind as to communicate to me.

This eminent physician, in attending a case in which he was nearly interested, and in which his endeavours were rewarded with success, found the greatest benefit from opium and the warm bath. The opium was given in the form of tincture, in moderate, but pretty frequent, doses. The bath was

\* Aretæus Cappadox says, that tetanus in general is even more apt to occur in winter than in summer. *De Caus. & Sign. Morb. Acut. lib. i. cap. vi.*

composed of milk and water, and the addition of milk was, no doubt, an improvement; for there is something in this as well as oil extremely soothing to the human nerves. Dr. Warren had intended to make trial of a bath of oil in case this had failed. He mentioned the following observation, with regard to the external application of oil, which could only have been suggested by that anxious attention that was paid to the case. It was found, that the uneasiness arising from the spasm was allayed by constantly drawing a feather wetted with oil over the temples, which had an evident effect in lulling the pain and spasm; for when this operation was left off, there was an immediate recurrence of these symptoms\*.

\* There are several valuable practical remarks on this complaint in some of the ancient authors, especially Aretæus. Their principal means of cure consisted in the application of warm oil to the whole surface of the body, particularly of the part affected. This author also recommends clysters of warm oil, occasionally combined with a medicine called *biera*, which consisted of certain spices and gums, with some purgative, such as aloes or colocynth. Aretæus Cappad. de Curat. Morb. Acut. cap. vi. Celsus, lib. iv. cap. iii. Goræus in vocabulum, *ispâ*.

It would appear, therefore, from this as well as the former cases, that opium and the warm bath are the chief remedies yet known which are of service in this complaint, and much will depend on the judicious management of them. The method of administering the opium, recommended by Dr. Warren, seems to be the most judicious, especially in constitutions not habituated to this medicine; and I have reason to think that cures are frequently missed by too great doses of this medicine.

There is a certain medium in giving opium, by which its best effects are obtained, for in an under dose it will produce disturbance instead of rest; and when it is given in large quantities, it frequently defeats the very end for which it is given, by throwing the body into convulsions which terminate in death. The rule for judging of the proper limits of this dose is, by its effect in inducing that stupor or insensibility which renders the senses incapable of irritation; for in this, as well as in every other case of disease, the cure seems ultimately to be the work of nature, the effect of medicine being only a secondary operation, by which it re-  
moves



moves some obstacle to the natural efforts of the constitution. Though a dose of opium greater than ordinary is required to produce this insensibility in cases of spasm, and though the constitution in that situation will bear more, yet even here it may be given to excess; and by beginning with small quantities, and giving it in frequent rather than large doses, the constitution will thereby be better reconciled to it, and it will also with more convenience admit of that gradual increase which is peculiarly necessary with this medicine. These ideas were suggested to me by Dr. Warren; and it may be farther added, in recommendation of his method, that the liquid form is preferable to the solid, as the effects of it will sooner be seen, and a better judgment can be formed how far it is proper to push it.

Great attention is also necessary in regulating the heat of the bath; for if it is not sufficiently warm, it will not have the effect of producing a due relaxation; and if it should be too hot, it will stimulate too much, and will have the farther inconvenience of making the patient very faint in a short time, and the success will depend greatly

greatly on the length of time for which the bath is continued. A private practitioner of Jamaica informed me, that he kept a patient with this complaint for five hours in the warm bath, and that he recovered. It cannot be well regulated without a thermometer, and  $93^{\circ}$  upon Fahrenheit's scale is perhaps the best temperature. Much will depend, however, on the constitutions of patients, as there is a great difference in individuals in this respect, so that the heat should be raised or lowered so as to afford the sensation of gentle and comfortable warmth. I have kept a patient in a bath thus regulated for six hours, which he could not have endured for half an hour had the heat been three or four degrees higher.

The circumstance next in consequence, in the cure of this complaint, is the keeping up a moisture on the skin, and guarding the surface of the body from the access of the air. This is particularly necessary with regard to the part itself, which should be constantly enveloped in warm, anodyne, and emollient applications. The good effects of this is particularly exemplified in the

the case which recovered under the care of Mr. Harris, who gave the diaphoretic medicine, composed of antimonial wine and laudanum, and applied the anodyne cataplasm to the external *fauces*. It was remarked, that the locked jaw was most incident to those wounded men, who lay in parts of the hospital where they were exposed to a current of air; and the cases of tetanus that most usually occur in the West Indies, independent of wounds, are those of slaves who fall asleep in the night-time in the open air.

The only other remedy that has been recommended for this most alarming symptom, so far as I know, is Peruvian bark. Dr. Rush, physician to the American army in the late war, recommends it from his own observation, with wine and blisters, and to dress the wounds with mercurial ointment. From some trials I have since made of the bark in St. Thomas's hospital, I have reason to think well of it as a remedy in this disease.

There

There is a singular species of accident to which engagements at sea are liable, called, perhaps improperly, *the wind of a ball*. In whatever manner it is accounted for, it is a fact, that a part is sometimes severely hurt, and even life destroyed, without any visible external injury or breach of the parts, nor any appearance of the body from whence the injury proceeded\*. There were two instances

\* This is a fact which does not admit of doubt; but the manner in which the effect is here produced is a matter of conjecture. It is perhaps owing to the compression and tremor of the air in consequence of its resistance to the motion of the ball. We can also conceive, that, with regard to an yielding part, such as the stomach or abdomen, a body flying with great velocity may even, for a moment, displace a portion of it by passing through the same space, without any other mechanical injury than contusion, in a manner similar to what happens to two balls in the act of collision in philosophical experiments, made to illustrate the nature of elasticity. From a fact to be mentioned hereafter, of a bone being broke to pieces, though the integuments were not injured, and as one leg is not usually affected by the ball which breaks or carries off the other, it would appear that mere proximity is not sufficient to produce this effect, and that there must be some sort of contact. It is, perhaps, explicable as follows. It has been ascertained, that all balls and bullets, except those from rifled pieces, have a rotatory motion in their flight. It is evident, that this motion on one side of the ball will coincide with the direction of its flight, and the other will be

in



stances in the last battle of a ball passing close to the stomach, and producing instant death, The one was a lieutenant of the Royal Oak, the other a common sailor of the Bedford. A man in another ship, in consequence of a ball passing close to his belly, remained without sense or motion for some time, and a large livid tumor arose on the part, but he recovered. I attended a man at the hospital at Barbadoes, who had the buttons of his trowsers carried off by a cannon ball, without any breach in the skin. The *pubis* was livid and swelled for some time after: he suffered exquisite pain from strangury, which seemed to proceed from a *paralysis* of the bladder, for he voided no urine without a catheter for near three months, after which time he recovered. I know a brave young officer\* in the army,

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in the opposite direction. Now if the latter side should come in contact with any part of the body, it is conceivable, that in place of carrying it away, it would roll over it, as it were, and only make a contusion. Some have attempted to account for these accidents by alleging, that they may proceed from a spent ball or obtuse splinter striking the part; but if this were the case, the offending body would drop upon the deck, and be perceived, which is not the case.

\* The honourable Captain Fitzroy, now Lord Southampton.

who

who had his epaulette carried off by a cannon ball at Charlestown, in consequence of which the shoulder and adjacent parts of the neck were affected for some time. A like accident happened to a marine officer in one of the late engagements; but in neither of these was the head materially affected, nor is it so apt to be affected in this way as the stomach. I never knew death the consequence of the wind of a ball on the head; though an officer\* in the Sultan, at the battle of Grenada, was so stunned by a shot passing close to his temple, as to be insensible for some time, but he recovered entirely in a few hours†.

In some cases the bones sustained a severe injury from accidents of this kind. Two instances of it have come to my knowledge: the one was an officer, who fell down during an engagement without any obvious cause. Upon examination, the thigh was found to be broken, and the limb was two inches shorter, which seemed to proceed

\* Colonel Markham.

† Animals are affected by these accidents as well as men. A cow in the Duke was killed in one of the actions in April, by a double-headed shot passing close to the small of her back.

P p

from

from the bone being pulverized, as it were. There was no pain. The integuments were not in the least injured; so that this appears to have been what is called the wind of a ball, but what ought more properly, perhaps, to be termed the *brush* of a ball. In the other instance, two of the false ribs were fractured and dislocated, with very little visible affection of the skin, though the clothes were torn. This accident proved fatal.

The class of wounds most peculiar to a sea engagement, are scorches from the accidental explosion of gunpowder; and in most of the campaigns in which I have served, they have been very frequent and fatal. Few accidents, however, of this kind happened in the late engagements; so that we had but little experience of this sort of wounds in April, 1782. But on former occasions they were very frequent, and the best application to the burnt parts was found to be linseed oil, which some of the surgeons mixed with lime-water, others with cerusse, and both compositions answered well. Opium was found of great use in alleviating pain and procuring rest, thereby conducing to recovery, as well as present ease, care being taken to guard against costiveness by the use of clysters.

In the battles of 1780 and 1781, one-fourth part of the whole killed and wounded was from this sort of accident; but on the 9th and 12th of April, 1782, only two accidental explosions of gunpowder happened in the whole fleet, by one of which one life was lost, by the other, two. This difference was owing partly to greater experience and habits of caution acquired in the course of the war, and partly to certain improved methods in working the artillery introduced by Sir Charles Douglas: these consisted, 1st, in wetting the wads, which prevents their inflaming and blowing back, when in battle the weather side of the ship is engaged; a circumstance which, without this precaution, gives occasion to a number of accidents, by the burning parts catching the loose powder, or setting fire to the cartridges. 2dly, In the use of goose-quill tubes and small priming boxes, made of tin, instead of the large horns formerly in use, whereby great quantities of powder were scattered about and exposed to accidental fire. 3dly, In the use of locks, which was practised with great success in several ships, and was found to make the operation both more safe and more expeditious.



It frequently happens that men bleed to death before assistance can be procured, or lose so much blood as not to be able to go through an operation. In order to prevent this it has been proposed, and on some occasions practised, to make each man carry about him a garter, or piece of rope-yarn, in order to bind up a limb in case of profuse bleeding. If it should be objected, that this, from its solemnity, may be apt to intimidate common men, officers at least should make use of some such precaution, especially as many of them, and those of the highest rank, are stationed on the quarter deck, which is one of the most exposed situations, and far removed from the cockpit, where the surgeon and his assistants are placed. This was the cause of the death of Captain Bayne, of the *Alfred*, who, having had his knee so shattered with a round shot, that it was necessary to amputate the limb, expired under the operation, in consequence of the weakness induced by loss of blood in carrying him so far. As the Admiral, on these occasions, allowed me the honour of being at his side, I carried in my pocket several tourniquets of a simple construction, in case  
2 accidents

accidents to any person on the quarter deck should have required their use.

It sometimes happens, however, that no hæmorrhage arises from a limb being carried off by a ball. The surgeon of the *Fame* related to me an instance of this, in which the thigh was cut through by a shot near its upper part, all except a little flesh and skin, and yet not the least hæmorrhage followed. This may have been owing to the limb being entirely severed, or nearly so, whereby the vessels contracted more easily than if they had been partially divided. All that was done for this man was to remove the limb, and to saw off the jagged end of the bone. He survived six days, still without bleeding, and died of the locked jaw.

One of the nicest and most important points upon which a surgeon is called to decide, is with regard to the propriety of amputation, and also the period at which it should be performed. With respect to the former, I feel myself incompetent to give any directions, being unacquainted with the practice of surgery. With respect to the second, I remember to have heard the late

Dr. William Hunter, in his lectures, remark, that men whose strength has been impaired by the confinement and long suffering from an injury, survive amputation more frequently than those who undergo it in the height of their health and strength after a recent injury, and was therefore inclined to dissuade from an early operation, if the nature of the wound would admit of delay. There are several reasons, however, which render early amputation more advisable for sailors, than for soldiers or others who live on shore. 1st. The motion of a ship renders fractures more unmanageable. 2dly. It is observed by Mr. Home, that the constitution of sailors being reduced by their manner of life, they are in some measure at all times in the state described by Dr. Hunter as favourable to amputation\*.

I was

\* The following statement may serve as a subject of comparison to those who perform amputations on board of ships at sea.

In Haslar hospital, between the year 1772 and the year 1778, there were four patients had the thigh amputated, of whom there died one; twenty-seven had the leg amputated, of whom there died ten; two had the forearm amputated, of whom there died none; seven had their arms amputated, of whom there died two. Total amputations forty. Deaths thirty.

After the action of the 27th of July 1778, there were brought

I was informed by several of the surgeons, that the method of taking up the vessels by the *tenaculum* was found to answer extremely well; and many of them imagined, that the locked jaw was not so apt to be brought on by this mode of operation as by that of the needle. But it is hardly to be attempted in time of action, for want of steadiness and a good light, and it was chiefly at the hospitals that this practice was found so successful.

Mr. Alanfon's method of amputation by a great retraction of the muscles, so that the fleshy parts shall meet over the bone and unite in the first intention, was attended with great success in the West Indies, particularly at the hospital at St. Lucia, under the care of Mr. Bulcock.

It may be remarked, that though all sores and wounds in the foot and leg are difficult

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brought to Plymouth hospital the following cases of stumps, in consequence of amputations performed on board; seven thighs, of whom one died; five legs, of whom two died; fourteen arms, of whom five died; two fore-arms, of whom none died. Total amputations twenty eight. Deaths eight.

Eight patients underwent amputation after coming to the hospital, of whom three died. I owe these statements to Mr. Home, who was one of the assistant surgeons at Plymouth in 1778.



of cure in a hot climate, I have observed, that, where the constitution is good, those in the thighs, arms, trunk, and head, are rather more easy of cure than in Europe, and that parts divided by incision very readily unite by the first intention. Instances of recovery from wounds in the most unfavourable circumstances, occurred after the disaster of Colonel Baillie in 1780 in the East Indies, which do not seem possible in a cold climate. In reasoning upon this, it may be said, that as healing depends on a certain degree of vigour in the powers of life, this should not err either on the side of excess or defect. If it is too great, as in the case of a hale, plethoric constitution in a cold climate, too much inflammation is apt to be excited; and if too feeble, as happens in a hot climate, in the lower extremities, which are far removed from the source of life and circulation, the salutary effort is not strong enough to generate new organised parts. But in the trunk of the body, in such a climate, the powers of the animal œconomy are in that just medium which is most favourable to this operation of nature.

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## PHARMACOPŒIA THERAPEUTICA.

## NAUTIS ACCOMMODATA.

**M**EDICAMENTORUM simpliciorum, quæ ad medicinam faciendam apud nautas maxime sunt necessaria, catalogum, methodum item medendi, quatenus rem medicamentariam spectat, huic operi subnectere mihi non alienum videtur.

Catalogum istum jam publico jure exhibere licet, materiæ medicæ enim apparatus, quocum chirurgi militiæ navali merentes instrui debent, de novo in anno 1796 constitutus est. In hac recensione rerum plus quam dimidium recisum; et eodem tempore summâ auctoritate decretum est, ut publicis sumptibus chirurgi medicamentis, quæ primarium obtinent locum in morbis curandis, in perpetuum donarentur.

Rei medicæ ubique quidem conducit, potissime autem apud nautas et milites, remediorum simplicitati rationem habere, tum numero, tum præparatione, tum administratione. Quandocunque plura medicamenta simul adhibentur, singulorum veros effectus dignoscere vix possibile est. Quoniam etiam in navibus defunt armamenta pharmaceuticæ exquisitori exequendæ commoda, formulis quam minime

nime perplexis studere oportet. Methodo quoque exacte ordinatâ varias manipulationes et ministeria faciliora et certiora fiunt. Talis denique ratio rerum facilius et commodius in militiâ quam in medicinâ apud privatos exercendâ perfici potest, in illa enim omnes ægri sexûs sunt unici, adulti omnes, et universi fere temperamento firmo gaudent.

*Catalogus Medicamentorum quibuscum Chirurgi sumptibus publicis donantur.*

Cinchonæ in pulverem tritæ, libræ octo\*.—Hydrargyri unciz quatuor.—Calomelanos unciz quatuor.—Unguenti hydrargyri fortis unciz quatuor.—Opii unciz quatuor.—Pulveris antimonialis uncia una.—Succi limonis congii novem.—Ipecacuanhæ in pulverem tritæ unciz duæ.—Magnesiæ vitriolatæ libræ octo.—Natri vitriolati libræ quatuor.—Rhabarbari Indici in pulverem triti unciz tres et dimidia.—Sennæ libra una.—Radicis jalapii unciz octo.—Emplastri cantharidis libra una.—Kali præparati unciz quatuor.—Spiritus vini rectificati libra una.—Acidi vitrioli diluti libræ duæ et unciz octo.

Quantitatem cujusque medicamenti in hac enumeratione, ac in ea quæ sequitur, notatam, in usum centenorum hominum sufficere arbitrio publico statutum est, et quantum usu absumatur, fit tantidem supplementum quotannis, ut fiat iterum copia integra quæ principio suppeditata est. Excipiuntur autem acidum vitrioli dilutum, pulvis antimonialis, et succus limonis, quæ subministrantur subinde pro re natâ secundum regulam olim institutam antequam alia medicamenta publicâ munificentia concessa fuerant.

\* Cum ad navigationem in Asiam, Africam, vel regiones torridas Americæ, expediuntur naves, tum copiz duplæ suppetit munimen.

*Catalogus Medicamentorum quibus Chirurgi suis sumptibus  
sefe instruere imperantur.*

Aloës focotrinæ uncia una.—Antimonii tartarifati drachmæ quatuor.—Gummi ammoniaci uncia una.—Gummi Arabici uncia quatuor.—Magnesiæ uncia quatuor.—Florum chamæmeli uncia octo.—Quassia uncia una.—Cretæ præparatæ uncia quatuor.—Camphoræ uncia duæ.—Mannæ uncia quatuor.—Nitri purificati uncia octo.—Florum sulphuris libra una.—Zinci vitriolati uncia una.—Olei terebinthini uncia quatuor.—Liquoris volatilis cornu cervi uncia quatuor.—Tincturæ lavendulæ uncia tres.—Olei menthæ piperitidis drachmæ duæ.—Salis cornu cervi uncia una.—Radici zinziberis uncia quatuor.—Gummi guaiaci uncia duæ.—Tincturæ scillæ uncia una.—Chrysellorum tartari in pulverem tritarum uncia octo.—Adipis suillæ uncia octo.—Ceræ flavæ uncia octo.—Cupri vitriolati uncia una.—Argenti nitrati drachma una.—Cerussæ acetatæ uncia una.—Aquæ lythargyri acetati uncia octo.—Hydrargyri nitrati rubri uncia una.—Emplastri ceræ uncia octo.—Emplastri lithargyri uncia octo.—Emplastri lithargyri cum hydrargyro uncia quatuor.—Emplastri lithargyri cum gummi uncia quatuor.—Unguenti resinæ flavæ uncia octo.—Unguenti ceræ uncia octo.—Lapidis calaminaris uncia octo.

Hæc publicâ auctoritate imperantur, chirurgis autem licet aliis medicamentis qualibus & quantis velint se instruere.



FORMULÆ QUÆDAM  
MEDICAMENTORUM  
AD MEDICINAM FACIENDAM APUD NAUTAS  
ACCOMMODATIORES.

IN FEBRE CONTINUA.

PULVIS EMETICUS COMMUNIS.

℞. PULVERIS radicis ipecacoanhæ grana decem, antimonii tartarifati grana duo, misce.

MISTURA CATHARTICA COMMUNIS.

℞. Foliorum fennæ uncias sex, aquæ ferventis libras sex. Mäcера donec pene refrixerit, & adjice vel natri vitriolati vel magnesiæ vitriolatæ libram unam cum semisse. Dein cola & admisce tincturæ fennæ uncias octo. Dosis est ad uncias tres.—Interdum conducit adjicere singulis dosibus, vel pulpæ tamarindorum semunciam, vel mannæ drachmas duas, vel antimonii tartarifati semigranum, vel pulveris jalapii grana decem.

PULVIS CATHARTICUS.

℞. Calomelanos grana sex, pulveris radicis jalapii grana duodecim. Misce.

ENEMA COMMUNE.

Aquæ marinæ tepidæ uncias duodecim.

POTUS COMMUNIS.

Decoctum hordei.—Conveniat adjicere singulis libris pro re natâ, vel pulpæ tamarindorum unciam dimidiam, vel crysfallorum tartari drachmam unam,  
vel

vel nitri scrupulum unum, vel acidi vitriolici diluti guttas decem, vel succi limonum unciam unam vel alteram, vel gummi arabici scrupulos duos, vel vini uncias quatuor, sex, vel octo, vel frustum panis tosti.

## VINUM EMETICUM.

℞. Antimonii tartarifati scrupulos duos, aquæ ferventis uncias duas, vini albi uncias octo. Solve antimonium in aquâ & adde vinum. Assumatur drachma una omni quadrante horæ, donec vel excitetur vomitus, vel alvus solvatur. Deinde assumatur semi-drachma sextâ quâque horâ.

Sumantur pulveris antimonialis grana tria vel quatuor quartâ vel sextâ quâque horâ. Ne disperdatur, adhibeatur vel formâ pilulæ cum aliquo idoneo additamento, vel si detur in formâ pulveris adjiciatur pauxillum farinæ, vel alicujus pulveris innocui.

## MISTURA SALINA.

℞. Kali præparati drachmas duas, succi limonum, vel aceti, vel acidi vitrioli, quantum satis sit ad saturandum salem, aquæ puræ uncias duodecim. Bibatur sexta pars post unamquamque dosim pulveris antimonialis. Conferat adjicere interdum vel cretæ præparatæ scrupulum, vel nitri grana decem.—Conducit aliquando sumere hanc misturam statim postquam kali & succus limonum mixta fuerint, scilicet in ipsa ebullitione. Hoc imprimis utile est cùm vomitus vel nausea vexent.

Fieri potest talis mistura cum sale cornu cervi loco kali, quæ magis prodest in quibusdam febribus, præcipue si malum accesserit rheumaticum.

## \* PILULA DIAPHORETICA.\*

℞. Opii purificati grana duodecim, antimonii tartarifati grana sex, conservæ rosæ vel micæ panis femi-drachmam. Contunde simul & divide in pilulas viginti quatuor. Devoretur una horâ somni. Interdum pro fit dare unam bis die, vel duas horâ decubitus.

## † MISTURA SEDATIVA.

℞. Misturæ camphoratæ uncias sex, tincturæ opii guttas viginti. Misce. Bibatur tertia pars ter die.—Aliquando conducit admiscere singulis dosibus aquæ ammoniæ acetatæ drachmas tres, vel vini emetici guttas triginta.

## BOLUS SEDATIVUS.

℞. Confectionis aromaticæ scrupulum unum, opii purificati grani quartam partem, tincturæ opii guttas quatuor. Misce. Conducit adjicere interdum castorei Russici grana decem. Assumatur sextâ quâque horâ.

## BOLUS SERPENTARIÆ COMPOSITUS.

℞. Pulveris serpentariæ Virginianæ grana decem, camphoræ grana quatuor, confectionis aromaticæ quantum satis sit. Assumatur ter die.—Interdum conducit addere pulveris cinchonæ drachmam dimidiam, vel superbibere decocti cinchonæ uncias duas.

Duæ compositiones proxime supra dictæ feбри ingravescenti occurrere statuuntur, urgentibus scilicet virium prostratione, subsultu tendinum, et delirio miti, at calore omnino vel parum aucto. Pro sunt eodem tempore vinum et vesicatoria.

## ELECTUARIUM AD CONVALESCENTES.

℞. Pulveris cinchonæ, florum chamæmeli, singulorum unciam unam, pulveris zinziberis scrupulos duos, syrupi quantum satis sit. Dosis est circi-

\* Hæc formula ex Pharmacopœia Nosocomii Sti. Thomæ deprompta est.

† Vide pag. 378.

ter drachmam ter die.—Interdum adjiciantur vel rubiginis ferri drachmæ tres, vel pulveris serpentariæ Virginianæ drachmæ duæ.

## IN FEBRE INTERMITTENTE.

Adhibeantur in initio eadem medicamenta ac in initio febris continuæ. Deinde

Sumatur cinchonæ drachma una, secundâ vel tertiâ quâque horâ, vel etiam singulis horis, absente paroxysmo febrili.—Interdum confert dare singulas doses ex spiritûs vini tenuis (*rum dicti*) unciâ unâ.

Si cinchona frustra adhibita fuerit, fauste adhiberi possint medicamenta infra præscripta.

\* R. Zinci calcinati semi-drachmam, conservæ rosæ vel panis quantum satis sit. Contunde simul & divide in pilulas quindecim. Sumatur una ter die, augendo dosim si premerit morbus, & si ferat ventriculus.

Vel,

R. Zinci vitriolati grana duodecim, aquæ puræ uncias tres. Sumatur tertia pars ter die, augendo dosim si opus fuerit & si ferat ventriculus.

Vel,

† R. Tincturæ rhabarbari uncias duas, tincturæ fennæ drachmas sex. Misce. Sumatur paucas horas ante paroxysmum.

Vel,

‡ Cinchonâ frustra datâ, aliquando conferat dare ægro quotidie, vel calomelanos, vel pilularum ex hydragyro quantum & quamdiu sufficiat ad levem ciendum ptyalismum, & deinde instituere curam de integro cum cortice Peruviano.

\* Vide pag. 442.

† Ex auctoritate Cl. Huck Saunders.

‡ Ex auctoritate Cl. Huck Saunders.

Vel,



Vel,

Sumantur tincturæ opii guttæ triginta duas horas ante accessum febris, ex poculo potûs communis cum liquoris volatilis cornu cervi drachmâ unâ, vel cum tincturâ rhubarbari et sennæ ut supra præscriptum.

Vel,

℞. Arsenici albi in subtilem pulverem triti grana decem, conservæ cujusvis vel micæ panis drachmas tres contunde & divide in pilulas octoginta. Sumatur una ter indie.

Vel,

Sumantur solutionis saturatæ arsenici albi guttas decem ter vel sæpius indie.

Vel,

℞. Arsenici albi in pulverem triti drachmam unam, aquæ puræ quod satis sit, coque tantisper balneo aquæ ad arsenici solutionem, et per chartam cola. Sint solutionis mensurâ unciz quindecim.

℞. Hujus solutionis drachmam unam, aquæ puræ uncias tres, spiritus vini tenuis unciam unam, sacchari drachmas duas. Misce. Dosis uncia dimidia bis indie.

## IN DIARRHOEA SIMPLICI.

### BOLUS AD DIARRHOEAM.

℞. Cretæ præparatæ scrupulum unum, pulveris rhabarbari grana quindecim, pulveris corticis cinnamomi grana sex, opii purificati granum dimidium, tincturæ opii guttas quinque, syrupi quantum satis sit. Semel sumatur.

℞. Misturæ cretaceæ (Pharm. Lond.) cum duplici gummi arabico libram unam, tincturæ opii guttas decem. Absumatur totum partitis vicibus nychthemero, incipiendo duodecim horas post datum medicamentum novissime præscriptum.—Interdum adjiciatur tincturæ cinnamomi uncia dimidia.

\* Hæc formula adhibetur cum successu felici in Nosocomio Hassariensi.

## IN CHOLERA MORBO.

- ℞. Decocti hordei vel avenæ libras tres; pulveris gummi arabici unciam unam cum semisse, tincturæ opii guttas triginta. Hauriatur quam primum libra una, & deinde libra dimidia omni horâ usque ad levamen mali.—Si parari poterit caro vitulina, vel pullus, jusculum tenue ex uno vel altero horum confectum, vice decocti supra dicti adhibeatur.

## IN DYSENTERIA ACUTA.

Sumat æger quamprimum emeticum commune.

- ℞. Decocti hordei vel avenæ libras duas, salis cathartici unciam unam cum semisse, antimonii tartarifati grana duo. Misce. Hujus hauriatur tepide primò libra dimidia, & deinde unciae quatuor omni horâ donec alvus copiose & iteratim dejecerit.
- ℞. Pulveris ipecacoanhæ grana duodecim, cretæ præparatæ drachmas duas. Misce et divide in chartulas duodecim. Sumatur una ter die. Si æger vehementer febricitarit satius erit dare ter die vini emetici drachmam unam ex cyatho amplo decocti hordei tepidi.
- ℞. Pulveris ipecacoanhæ grana duo, pulveris opii purificati exsiccati granum unum, nitri grana decem. Misce. Sumatur horâ somni.

## ENEMA EMOLLIENS.

- ℞. Amyli unciam dimidiam, aquæ puræ uncias decem. Coque ad idoneam spissitudinem.

Vel,

- ℞. Seminum lini drachmas sex, aquæ puræ uncias duodecim. Coque per quadrantem horæ & cola liquorem pro enemate.

ENEMA ANODYNUM.

℞. Enematis emollientis uncias quatuor, tincturæ opii guttas quadraginta. Misce.

IN DYSENTERIA CHRONICA.

BOLUS CATHARTICUS.

℞. Pulveris rhabbarbari grana quindecim, calomelanos grana quinque. Misce, fiat pulvis. Mane sumentus ex idoneo vehiculo, & repetendus post paucos dies si opus fuerit.—Vice hujus interdum conducatur dare misturæ catharticæ communis uncias duas.

SOLUTIO CAMPECHENSIS.

℞. Extracti ligni Campechensis drachmam unam cum semisse, tincturæ cinnamomi unciam unam. Tere simul et admisce aquæ puræ uncias quinque. Sumatur uncia una ter die.

DECOCTUM AMARUM.

℞. Corticis simaroubæ drachmam unam, vel quassia drachmam dimidiam, aquæ puræ libram unam cum semisse. Coque paulisper et cola. Absumatur totum quotidie dosibus tripartitis. Adjici possint singulis dosibus pro ratione symptomatum, vel cretæ præparatæ scrupulus unus, vel pulveris ipecacoanhæ granum unum, vel tincturæ cinnamomi drachmæ duæ, vel tincturæ opii guttæ quinque.

Siquando hic morbus contumax fuerit, confert illinere quotidie hypogastrium unguenti ex hydrargyro drachmâ dimidiâ.

Sit pro potu communi in hoc morbo aqua pura, frusto panis recens tosti adjecto, & pauxillo spiritus vini tenuis (*rum dicti*) admixto. Sit pro victu communi salab, vel farina tritici in pulmentum tenue ex aquâ purâ cocta.

℞. Ol. amygdalæ vel olivæ, ceræ flavæ, singularum unciam dimidiam, spermatis ceti drachmas duas, liquefiant leni igne et postquam frigefacta fuerint terantur cum vitello unius ovi, vel mucilaginis quantum satis sit, admiscendo paulatim aquæ puræ uncias quinque, et addantur vel tincturæ thebaicæ guttæ quindecim, vel tincturæ opii camphoratae drachmæ tres, sacchari albi drachmæ duæ. Dosis fescuncia sextâ vel octavâ quâque horâ, ubicumque excoriationem detur locus suspicandi intestinorum.

## IN INTESTINIS INFLAMMATIS.

### SOLUTIO SALIS CATHARTICI.

℞. Decocti hordei libram unam, magnesiæ vitriolatæ uncias duas. Misce ut fiat solutio. Bibatur, post sanguinis missionem, uncia una omni semihorâ donec alvus bis dejecerit.

Adhibeantur hypogastrio cucurbitulæ cruentæ, vel hirudines plures. Admoveatur ibidem epispasticum satis amplum. Infundatur enema cum oleo et pauxillo salis cathartici.

IN ILEO, vel COLICA PICTONUM, vel morbo in regionibus torridis *DRY BELLY ACHE* dicto.

℞. Aquæ menthæ semilibram, magnesiæ vitriolatæ uncias duas. Misce. Sumatur uncia una omni horâ.

### \* PILULÆ CATHARTICO-ANODYNÆ.

• Extracti colocynthidis compositi drachmam dimidiam, opii granum unum & dimidium, olei menthæ guttam unam. Contunde in massam & divide in pilulas decem. Sint pro una dosi. Paucas post horas, si alvus non rite responderit, exhibeantur misturæ catharticæ uncia duæ, vel † olei ricini uncia una,

\* Hæc formula ex Pharmacopœiâ Nosocomii Sti. Thomæ excerpta est.

† Vice olei ricini dare licet olei amygdalæ unciam unam cum tincturæ sennæ uncia dimidiâ.



& repetantur ut opus fuerit.—Interdum in hoc malo divexat vomitus cui opitulatur mistura salina in ebullitione, vel magnesiæ semidrachma ex aquæ menthæ fescunciâ. Calomelas tum optimum catharticum, ob pondus enim ægre rejicitur.

Perfricetur hypogastrium oleo tepido.

Ineat æger in balneum tepesactum ad 93° therm. Fahren. per horam unam vel etiam diutius.

Denique suffletur in anum fumus nicotianæ.

Vel,

℞. Nicotianæ drachmam unam, aquæ puræ ferventis libram unam.—Macerata per horam dimidiam & cola pro enemate.

In ileo sæpe prodest missio sanguinis ex abdomine per hirudines vel cucurbitulas cruentas.

## IN HÆMORRHOIDE.

### BOLUS HÆMORRHOIDALIS.

Sumatur florum sulphuris drachma dimidia, cum copiâ duplici crystallorum tartari semel vel bis die, ut alvus plus aut minus segnitis fuerit.

Si sanguinis ex ano profluentis magna fuerit vis, & præcipue si ex alto fonte effluerit, valde proderit medicamentum infra præscriptum.

\* ℞. Olei lini sine calore expressi, tincturæ rhabarbari, singulorum drachmam unam. Misce. Sumatur ter indie.—Vice olei lini adhibere licet olei amygdalæ drachmam unam, cum mucilaginis gummi arabici drachmâ unâ.

## IN ALVO ASTRICTA.

### PILULÆ LAXANTES.

℞. Aloes focotrinæ drachmam dimidiam, pulveris rhabarbari vel jalapii drachmam unam, pulveris zinzibris

\* Hæc formula ex auctoritate Cl. Griffiths. In periculis a me ipso factis felicissimum successum ex hoc medicamento percepi.

beris drachmam dimidiam, mucilaginis gummi arabici quantum satis sit. Contunde et divide in pilulas quadraginta. Sumantur una, duæ, vel tres pro re natâ.

#### ELECTUARIUM ECCOPROTICUM.

℞. Pulveris jalapii unciam dimidiam, pulpæ tamarindorum unciam unam, pulveris zinziberis semidrachmam, syrupi *melasses* dicti quantum satis sit. Sumatur circiter drachma pro re natâ.—Interdum profit adjicere crystallorum tartari vel salis cujusvis cathartici unciam dimidiam.

#### IN CATARRHO.

##### LINCTUS.

℞. Conservæ rosæ mellis vel syrupi spissi unciam unam, mucilaginis gummi arabici unciam dimidiam, succi limonis aceti, vel acidi vitriolici quantum satis sit ad gratum saporem conciliandum. Misce. Sumatur pauxillum sæpius.—Interdum adjiciatur vel salis nitri drachma dimidia, vel tincturæ opii guttæ decem.

Potui detur decoctum hordei in quo coquatur guarum passarum uncia una, & sub finem cocturæ adjiciantur feminum lini drachmæ duæ pro singulis libris decocti.

Si febricitârit æger, sumatur mistura salina cum pulveris antimonialis granis tribus ter die.

#### IN PLEURITIDE ET PERIPNEUMONIA.

℞. Decocti hordei libras duas, pulpæ tamarindorum quantum satis sit ad gratum saporem, nitri drachmam unam. Misce. Hauriatur affatim. N. B. Si tamarindi moverint alvum sæpius quam semel aut bis die adhibeatur vice ejus syrupus *melasses* dictus.

Sumatur mistura salina cum pulveris antimonialis granis tribus sexta vel quartâ quâque horâ.

Præmittatur semper venæ sectio, et adhibeatur victus tenuissimus.

## IN HÆMOPTOE.

Hauriat æger infusi rosæ uncias tres quater die. Interdum adjiciatur salis cathartici amari drachmam unam. Dentur in intervallis nitri grana quindecim, vel scrupulus ex poculo aquæ, vel conservæ rosarum drachmâ.

### HAUSTUS OLEOSUS.

\* ℞. Olei amygdalini, aquæ menthæ, singulorum unciam, mannæ drachmas tres. Misce. Sumatur ter die. Sæpe conducit adjicere singulis dosibus tincturæ opii guttas quatuor vel quinque.

## IN TUSSI ASTHMATICA.

### PILULÆ PECTORALES.

℞. Gummi ammoniaci drachmas tres, saponis Hispaniensis drachmas duas, pulveris radicis scillæ grana sex, opii purificati grana tria, syrupi *melasses* dicti quantum satis sit. Contunde simul et divide in pilulas quadraginta octo. Sumantur quatuor bis die. Interdum adjiciuntur aloes grana tria.

## IN ASTHMA TE A DIATHESI HYDROPICA PROVENIENTE.

### HAUSTUS DIURETICUS.

℞. Aquæ puræ unciam unam et dimidiam, pulveris scillæ aridæ grana duo, tincturæ lavendulæ compositæ guttas triginta, kali præparati grana decem. Misce. Sumatur bis vel ter die.—Interdum adjici-

\* Hoc medicamentum speciatim his hæmorrhagiis accommodatum quæ ex aliquo viscere læso vi externâ exoriantur, quales in nave sæpius quam alicubi accidere solent, ex præcipitiis & ex corpore colliso a molimine machinarum & tormentorum.—Prodest quoque in his casibus pulvis ipecacuanhæ compositus.

cere

cere licet haustui vespertino tincturæ opii guttas viginti.

Vel,

BOLUS EX HYDRARGYRO CUM SCILLA.

- ℞. Pilularum ex hydrargyro grana quinque vel usque ad decem, pulveris radices scillæ grana duo. Misce. Sumatur horâ decubitûs per tres vel quatuor noctes consequentes.

Vel,

- ℞. Aquæ puræ ferventis libram unam, foliorum siccorum digitalis purpureæ drachmam unam. Coque per sextam partem horæ et cola. Sumatur uncia dimidia ter indie. Vel fumantur pulveris ejusdem grana duo ter indie.

## IN RHEUMATISMO ACUTO.

MISTURA DIAPHORETICA.

- ℞. Aquæ puræ uncias tres, aquæ ammoniæ acetatæ unciam unam et dimidiam, pulveris antimonialis grana quindecim. Sumatur tertia pars ter die.— Interdum adjiciantur nitri grana decem singulis dosibus.

Bibatur affatim decoctum hordei tepidum, cum nitri drachmâ unâ in singulis libris.

HAUSTUS SUDORIFICUS.

- ℞. Misturæ camphoratæ unciam unam et dimidiam, aquæ ammoniæ acetatæ unciam dimidiam, vini emetici guttas quadraginta, tincturæ opii guttas viginti. Misce. Sumatur horâ somni, vel etiam sæpius sed cum dimidiâ tincturâ.

## IN RHEUMATISMO CHRONICO.

- ℞. Tincturæ guaiaci volatilis drachmas duas. Sumatur ex cyatho potûs communis ter die. Vel fumatur gummi guaiaci semidrachma super bibendo haustum ex salis cornu cervi scrupulo, et aquæ unciis tribus.
- ℞. Pulveris ipecacoanhæ compositi (Pharm. Lond.) scrupulum unum. Sumatur hora somni alternis noctibus.



Morbo vehementer et diu sævente pro remedio efficaci compertum est dare quotidie calomelanos granum unum vel grana duo, per viginti vel triginta dies.

## IN HYDROPE.

### PULVIS HYDRAGOGUS.

- ℞. Cryſtallorum tartari drachmas tres, pulveris jalapii grana quindecim, pulveris zinziberis grana quinque. Miſce, fiat pulvis, ſumatur alternis diebus. Interdum commodè adjiciuntur gambogiæ grana tria, vel pulveris iridis Florentini ſcrupulus unus.

### MISTURA DIURETICA.

- ℞. Infuſi gentianæ vel quaſſiæ vel abſynthii uncias decem, ſpiritus vini tenuis uncias duas, kali præparati drachmam unam. Miſce. Hauriantur uncix tres bis die.

### TINCTURA SCILLÆ. Pharm. Lond.

Sumatur drachma dimidia ter quaterve die ex hauſtu potus communis.

### PULVIS EX ELATERIO.

- ℞. Elaterii grana tria, ſacchari drachmam dimidiam. Miſce et divide in chartulas ſex. Sumatur una et repetatur ad intervallum ſemihoræ donec vomitus et cathariſis cieantur.

\* Ægro licet, imo prodeſt hoc morbo laboranti bibere ad libitum liquorem aliquem ſiti extinguendæ accommodatum, veluti decoctum hordei cum cryſtallis tartari.

## IN ERYSIPELATE.

- † ℞. Pulveris cinchonæ drachmam unam. Sumatur omni horâ vel interpoſitis duabus vel tribus horis.

\* Hujus doctrinæ auſtor eſt Hippocrates, quæ reſtaurata eſt auctaque a Cl. Milman in opusculo ſuo de hydrope:

† Hæc methodus medendi, quæ æque efficax ac ſimplex eſt, primo excogitata fuit a Cl. Georgio Fordyce medico noſocomii Sti. Thomæ, ubi & ipſe feliciffimo cum ſucceſſu eandem expertus ſum, in muneribus meis ibi fungendis.

## IN MORBO VENEREO.

## I. IN GONORRHOEA.

Hauriatur ad libitum infusum lini, vel decoctum hordei cum gummi arabici unciâ dimidiâ in singulis libris.

Sumatur calomelanos granum unum quotidie per viginti circiter dies.

\* R. Aquæ puræ distillatæ uncias octo, hydrargyri muriati granum unum. Misce. Injiciatur pauxillum in urethram bis vel ter die. Interdum conferat adjuvicere opii grana duo, vel adhibere cerussæ acetatæ grana duodecim loco hydrargyri muriati.

## IN GONORRHOEA BENIGNA.

R. Balsami capivi, tincturæ lavendulæ compositæ, singulorum guttas triginti, Misce. Sumatur bis vel ter die.

Vel,

R. Aluminis usti, pulveris rhæbarbari, singulorum partes æquales; terebinthinæ vel balsami canadensis quantum satis sit. Divide in pilulas pendentes grana tria singulæ. Sumantur tres bis vel ter die.

Commode adhibetur interdum injectio ex aquæ puræ unciis octo, zinci vitriolati vel aluminis granis octo ad sedecim.

## 2. IN ULCUSCULIS.

In initio feliciter adhibetur causticum.

R. Calomelanos drachmam unam, conservæ cujuscunque vel micæ panis quantum satis sit. Contunde in massam et divide in pilulas triginta. Sumatur una bis indies ut cieatur ptyalismus modicus. Persistet æger in usu medicamenti hujus per dies octo postquam sanata fuerint ulcuscula.

\* Vide opus Cl. Johannis Hunter de morbo venereo. Periti tamen sunt quidam, qui opinantur injectiones qualescunque hic nil valere. Gonorrhœa certe meoetur persæpe sine medicamentis vel interne vel externe adhibitis, solâ scilicet quiete, et abstinendo a victu acris, vel nimis lacteo, et a liquoribus vinosis,

Pro

Pro medicamento topico, utile erit inspergere ulcusculum cum pulvere hydrargyri nitrati.

### 3. IN BUBONE.

Illinatur artus lateris affecti infra inguen cum unguenti ex hydrargyro drachmâ dimidiâ quotidie.

Si abierit bubo in ulcus mali moris omittatur pro tempore usus hydrargyri, et sumatur quotidie \* opii purificati granum unum primo semel, dein bis, denique ter die vel etiam sæpius, et pulveris cinchonæ drachma una ter quaterve die.

### 4. IN VERA LUE, anginâ scilicet, osteocopiis, exostosis, et defædatione cutis.

Illinantur membra quotidie cum unguenti ex hydrargyro fortioris drachmis duabus quotidie usque dum cieatur † ptyalismus per dies triginta quinque, vel donec evanuerint symptomata.—Interdum vice litûs adhibere conveniat vel calomelanos granum unum ter die, vel pilularum ex hydrargyro grana quinque bis die, vel

℞. Hydrargyri muriati grana octo, spiritus vinosi tenuis libram unam. Fiat solutio, et sumatur uncia dimidia bis die. In ulceribus tonsillarum pernotabili est auxilio suffitum ex cinnabare in fauces inhalare semel vel bis quotidie. Methodus autem per litum efficacissima est.

Si ulcera mali moris exorta fuerint in quavis corporis parte, eadem, ut jam de bubone dictum est, fiant ‡.

IN

\* Vires opii in isto morbo primo innotuerunt ex experienciâ Cl. Nooth, dum præfuit nosocomiis militaribus in America, & pro optimo remedio a peritissimis medicis & chirurgis jam habetur.

† Non hic intelligitur ptyalismus veram esse causam quâ efficitur medela morbi, sed præcipitur ut pro argumento sit hydrargyrum in vasa minima permeasse adeo ut effectum edat in subigendo morbo. Vide Opus Hunteri,

‡ Acidum nitricum nuper famâ pro remedio contra syphilidem nobis innotuit. Multum autem de facultate ista discrepant sententiæ medicorum. Chirurgis navalibus pericula plura de hac re facta sunt, et suffragia prope equalia ex utrisque partibus lata sunt. Satis plane constat viribus

## IN ULCERIBUS MALIGNIS.

- ℞. Aquæ puræ libram unam, argenti nitrati (vulgo dictum causticum lunare) drachmam unam. Sit pro lotionē.

Vel,

Made fiat ulcus cum tincturâ myrrhæ.

Vel,

- ℞. Aquæ puræ libram unam, acidi nitrici drachmas duas. Sit pro lotionē, et minuatur acidum quando ulcus fiat magis sensibilis.

Vel,

- ℞. Unguenti hydrargyri nitrati (vulgo unguentum citrinum) partem unam, adipis suillæ partes tres. Misce. Augetur unguentum hydrargyri pro ratione sensibilitatis et irritabilitatis ulceris.

Vel,

- ℞. Unguenti resinæ flavæ unciam unam, hydrargyri nitrati rubri drachmam unam. Misce.

Partibus liquore fervente levis, adhibendum acetum frigidum. Pars levis vel immergi debet in aceto, vel lintamina eadem madida ei imponenda.

Partibus igne levis, adhibendum oleum lini cum pari portione aquæ calcis.

- ℞. Aquæ libram unam, aquæ lithargyri acetati drachmam dimidiam, vel cerussæ acetatæ grana quatuor, spiritus vini drachmas sex.

Vel,

- ℞. Cerussæ acetatæ scrupulos duos, spiritus vini drachmas sex, aquæ libram unam.

Glacies, vel aqua quâ liquefcit glacies, partibus adustis diu admota, summum beneficium adfert, tum leniendo dolore tum sanatione expediendâ

viribus quibusdam istius morbi subigendi gaudere hoc medicamentum. Sæpe autem spem fallere, et aliquoties medelam parum stabilem efficere æque constat. Re igitur rite perpensâ, me iudice, apud consultos viros in posterum pro adjumento aliorum medicaminum haberi potest, nequaquam autem pro solo remedio adhiberi debet. Datur a drachmâ unâ ad drachmas tres quotidie ex aquæ quanto satis sit ad obtundendam acrimoniam.

IN



## IN SCORBUTO MARINO.

Sumat æger quotidie acidi citrici unciam unam ter quaterve die.

℞. Aquæ puræ paullulum tepefactæ congios triginta, syrupi *melassés* dicti libras sedecim pondere, extracti pini uncias octo pondere, spumæ vel fæcis cerevisiæ libras duas mensurâ. Misce et agita valide cum baculo, deinde abeat in fermentationem, ut fiat cerevisia, quæ in vase clauso fervari debet. Ut diutius fervetur, proderit admiscere spiritus vini tenuis Gallici, vel qui *rum* dicitur, libras duas aut tres. Si infirma fuerint viscera adjicere juvabit vel lupuli vel summitatum absinthii vel quassia, vel zinziberis quantum fatis sit. Hauriat æger libras duas quotidie.

℞. Farinæ avenacæ libras tres, aquæ puræ congios quatuor. Misce. Macera donec liquor fiat acidulus, dein effunde dimidium et adjiciatur par copia aquæ puræ, et coque ad idoneam spissitudinem, ut cogatur in pulmentum. Sit pro victu assiduo cum vini et sacchari non purificati, vel syrupi *melassés* dicti, quantum sufficiat ad gratum saporem conciliandum.

His remediis deficientibus, adhibeatur quod sequitur.

℞. Aceti libras duas, nitri uncias duas. Misce. Suman-  
tur uncia una vel duæ ter quaterve die.

Ad alvum solvendam commode adhiberi potest electuarium eccoproticum e crystallis tartari et pulvere jalapii, cum syrupi vel tamarindi quanto fatis sit.

TO

RUFUS KING, Esq.

MINISTER PLENIPOTENTIARY FROM THE STATES  
OF AMERICA TO THE COURT OF LONDON.

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London, 26th November, 1798.

SIR,

**I** SIT down to perform the promise I made you this morning, of putting on paper some remarks on the nature of the yellow fever, and the means of preventing it.

In doing this I shall chiefly confine myself to those views of it in which the magistrate is concerned. The adopting of measures for the prevention of disease is one of the most important duties of a wise and patriotic government; and the discovery of these means, as well as the efficiency of the steps to be taken, must depend on a thorough knowledge of the causes by which it is excited and influenced. My opportunities upon actual service in the West Indies in the late war, when physician to the fleet under the command of Lord Rodney and Admiral Pigot, and my present official duty as a member of the Medical Board of the Navy, have necessarily brought to my knowledge a number of facts relating to this subject, and I shall be extremely happy if the communication of some of the most important of them can throw  
any

any light, which may prove useful to the American government in checking an evil so afflicting and calamitous.

The first question that occurs with a view to preventive measures is, whether this disease be infectious, and under what circumstances it is so.

In those situations in which I observed it in the West Indies, it was evidently so. There was the most incontestable evidence of this, both on board of ships, and at hospitals, and the doubts which have been started on this point, seem to have arisen from the operation of infection being blended with that of other causes, which must concur with it in order to give it effect.

But whatever doubts there may be on this subject in the West Indies, there can be none in the climate of North America. This will be best proved and illustrated by an example.

On the 16th of May 1795, the *Thetis* and *Hussar* frigates captured two French armed ships from Guadeloupe on the coast of America. One of these had the yellow fever on board, and out of fourteen men sent from the *Hussar* to take care of her, nine died of this fever before she reached Halifax on the 28th of the same month, and the five others were sent to the hospital sick of the same distemper. Part of the prisoners were removed on board of the *Hussar*, and though care was taken to select those seemingly in perfect health, the disease spread rapidly in that ship, so that near one-third of the whole crew was more or less affected by it.

This

This fact carries a conviction of the reality of infection, as irrefragable as volumes of argument, and it further affords matter of important and instructive information, by proving that the infection may be conveyed by the persons or clothes of men in health.

It is a question of still more consequence with a view to preventive measures, whether this epidemic has arisen in the towns of North America from internal causes, or whether it was imported from the West Indies.

In order to decide upon this, it will be necessary to go back into the origin of this disease, in so far as it can be ascertained.

After laying together and considering fully all the facts relating to this subject, it appears to me that the yellow fever cannot be produced, but in a season or climate in which the heat of the atmosphere is pretty uniformly, for a length of time, above the 80th degree of Fahrenheit's thermometer; that under the influence of this heat, Europeans newly arrived, and more especially in circumstances of intemperance, or fatigue in the sun, may be subject to it in many instances, but that it has usually become general only by the previous influence of that infection which produces the jail, hospital, or ship fever, or from the influence of putrid exhalations; and that when so produced, it continues itself by infection. It would be too tedious to enumerate the multiplied proofs of this, which have occurred to me in my connection with the public service. With regard to the effect of ship infection, it is enough to say that the seamen of ships of war from England having infectious fevers on board, were observed to be most subject to the yellow fever when they arrived in the West Indies, and that the troops which  
have



have been conveyed in ill-aired, crowded, and sickly transports, are the most liable to it after disembarking: this applies even to that part of them who have arrived in health. And with regard to the effect of putrid exhalations, I need only mention, that at the time of the battle of the 12th of April 1782, there was not a sickly ship in our fleet, but many of those officers and men who were sent to take care of the French prizes, were seized with the yellow fever; and it was observed, that when at any time the holds of these ships, which were full of putrid matter, were stirred, there was an evident increase of these fevers soon after.

It has been alleged by some authors, that the yellow fever is produced by the same marshy exhalations which produce the intermittent and remittent fevers, and that it is only a variety of the latter; but the remitting fevers differ from it in some essential symptoms, and the yellow fever has been known to arise, both in ships and on shore, where men were entirely out of the reach of the vapours of marshes.

It may naturally be expected that this infection, in common with all others, will not take effect except in particular circumstances. There have been physicians paradoxical enough to maintain, that the plague itself is not infectious, and their principal argument is, that numbers are exposed to it, without being affected by it. But the same may be said of the small-pox, and it is the nature of all infection to require a certain concurrence of circumstances, both external and in the constitution of those exposed to it; in order to its taking effect. One circumstance necessary to the operation of the infection of the plague is, a certain range of atmospheric heat. A temperature above 80° or below 60° will soon put a stop to this epidemic,

so that it was never known between the tropics, nor within the polar circles ; and it is only at certain seasons that it appears in the temperate zone.

The atmospheric heat necessary for the excitement of the yellow fever, begins where that of the plague leaves off, for it has never been known to arise and prevail but when the thermometer stood for some length of time pretty uniformly above  $80^{\circ}$ , as has been already stated.

But not only a certain degree of heat is necessary to bring the infection of the plague into action, but a concurrence of other circumstances, consisting in want of cleanliness and ventilation, and a certain obscure state of the atmosphere. London, in the last century, was never entirely free from the plague till 1666, and it had in that period been four times epidemic. The last time it was so was in 1665. In 1666 the great fire happened, which gave occasion to rebuilding the city on a more spacious and airy plan ; and the greater degree of personal cleanliness which began to prevail about that time, together with the construction of common sewers, have, no doubt, been the causes that have counteracted the introduction of it for the last hundred and thirty-two years.

It is farther in proof of the necessity of a certain given concurrence of circumstances, that particular classes of society are in a great measure exempt from it. Lord Clarendon, in the history of his own life, relates, that when he and other people of condition who had fled from the plague returned to London, they hardly missed one of their friends or acquaintances, the mortality having been confined almost entirely to the lowest orders of the people.

Though it is true, therefore, that in those years in which the plague has prevailed in London, it has become nearly extinct in the month of November, just after the infection had been accumulated to the utmost ; and though it is equally true, that the small-pox or measles will frequently occur and become epidemic, though no infection can be traced ; yet neither the one nor the other of these facts can be urged as proofs that these diseases are not infectious.

In applying these observations to the question concerning the importation of the infection into Philadelphia and the other towns of America, I cannot but think that they make greatly for the affirmative ; for it is agreeable to the analogy of all other infection, that it may be introduced so as to prove active in portions so minute as to escape detection, and at other times may fail of producing its effect, though in the most accumulated state.

The circumstances under which it appears in North America are, indeed, totally different from those in which it appears in the West Indies. This fever had not prevailed in Philadelphia from 1762 till 1793 ; whereas it occurs, more or less, every year in the West Indies, and its prevalence is in proportion to the number of new comers from Europe. If this disease were the spontaneous production of America, how comes it that it did not destroy the British armies which acted in the late war in Pennsylvania, Virginia, and Carolina, as it has done of late in the West Indies ? It is also against the laws of probability, that this fever should have arisen by mere accident in that year in which a number of French emigrants had arrived from the islands in which it prevailed, and in a year in which it had prevailed there to such an unexampled degree.

Supposing it established, therefore, as a truth, that this disease arose from imported infection, we are next to enquire, what are the precautionary measures that ought to be adopted to prevent its introduction, or counteract its influence.

These divide themselves into three heads: first, the prevention of the importation; secondly, the prevention of its spreading; thirdly, the removal of those circumstances which predispose to its action.

Under the first head is included the regulations relating to quarantines. To enter into the detail of this subject, would encroach too much upon your time and mine; and it would be unnecessary, considering the great fulness and accuracy with which this has been done by Dr. Russell, in his work on the plague.

The second head is extremely important, and the neglect of it has at all times given occasion to the extensive spread of pestilential disorders. The principle of it is comprised in these few words, "to discover the first beginnings of disease, and to cut off all intercourse with the infected." It is at this period only that such a measure can be effectual, the number of infected being small. I must refer to the same work for the detail of the regulations regarding this.

The third head is one which has not been commonly enumerated and treated of by those who have written on this subject. It is only, however, necessary to reflect on the present situation of London, to become sensible of its great importance. It is extremely doubtful how far this city owes its safety to quarantines; and there is no proof of the pestilence having ever been stopped in England by the vigilant detection of its first invasion, and the



consequent adoption of wise and vigorous measures to prevent intercourse. But the advantages of spacious and airy habitations, of personal cleanliness, of dryness and cleanliness from forming drains and common sewers, are undeniable. The commerce in this age to all parts of the world so far exceeds whatever was known in former ages, that there is, most probably, at all times enough of infection in the warehouses of London to kindle the flames of pestilence, if the fuel were duly prepared and disposed for its action.

I am not sufficiently acquainted with the towns of America to say what improvements they admit of in the points above mentioned: it is evident, however, that the causes of this fever are connected with those circumstances which belong to a town; for, if I am rightly informed, it has not spread into villages and single houses in the country. As the inhabitants of America possess habits of cleanliness in their persons and habitations in common with the rest of the civilized world in our times, the amendment required is not in these points. A circumstance which you mentioned to me regarding New York, to wit, that the fever prevailed only in that quarter of the town which adjoins the east river, and had not spread to that which borders on the north river, seems to point out the measures that are likely to be most adviseable and practicable for meliorating the air of the towns in the American states. Drains and common sewers\*, therefore, of the most perfect construction that can be devised for promoting dryness and sweetness, by carrying off all superfluous moisture, and for conveying all manner of

\* Even in the most remote antiquity common sewers were considered as essential to the health and comfort of great cities. Those of Rome are so ancient, that there is no historical record of the time of their construction, but we know they existed in the times of the kings. They were formed upon so great a scale, and with so much labour, that they were accounted one of the wonders of the world.

filth and soil under ground, could not fail to be highly conducive to general health, and to prevent the future visitations of epidemic fevers. Whether the late fever has been owing to imported infection, or to the bad air of the place, this precaution is equally founded upon reason. I consider the drains and sewers of London as the most essential circumstance in promoting that decency, comfort, and health, enjoyed so long by this great metropolis, in a degree of which I believe there is no example in ancient or modern times.

I am, with much respect,

Sir,

Your most obedient humble servant,

GIL. BLANE.

P. S. Upon revising the preceding letter, it has occurred to me, that in enumerating the different heads of preventive means, I ought to have mentioned what is called *expurgation*, that is, the methods taken for the expulsion and destruction of infection when the disease is declining, or has ceased. Dr. Russell is very full on this subject; but since he wrote, there is a method of fumigation introduced by Dr. Carmichael Smyth, of which he has published an account; and as this has acquired some name from trials made in the hospitals for prisoners of war and in the navy, I should think it would be worth a trial in America, as one of the means for the expurgation of the infection of the yellow fever.

TO

Sir JOHN HIPPISELY, Bart.

MEMBER OF THE QUARANTINE COMMITTEE OF THE  
TURKEY COMPANY,

---

London, 26th December, 1798.

Sir,

IN compliance with your wish, I send inclosed a copy of my letter to the American Minister on the nature of infection, and the means of counteracting it; and beg you will do me the honour of presenting it to the Turkey Company.

In our conversation on this subject some time ago, I mentioned to you some information I had from the Turkish Ambassador, which probably led you to think that what I lately wrote was addressed to him: but though it relates chiefly to the yellow fever, the observations apply to infection in general; and as my illustrations and arguments are mostly drawn from the plague, the practical remarks are nearly the same as if this epidemic had been expressly treated of.

I have, however, since I saw you, turned my thoughts still farther to this subject; and I cannot but feel the confidence you are pleased to repose on me, as imposing a most serious responsibility in what so deeply concerns the national safety and commercial interests of this country. This consideration will, I hope, prevent me from advancing

vancing any thing lightly in what I have farther to say on a subject so momentous.

I apprehend it ought to be a leading maxim in regulating the measures to be taken for the exclusion and destruction of infection, that the means should in all points be, as nearly as possible, commensurate to the end. It is as dangerous to go beyond the object as to fall short of it. Unnecessary rigour not only creates personal hardship, commercial loss and distress, but defeats its own purpose, by loosening the sanctions and motives which ought to ensure the strict observance of rules. The temptations arising from self interest to contravene whatever militates against itself, are in all cases very strong, but must be doubly so where there is a conviction of the unnecessary severity of the restraining laws.

The rigour of quarantines should therefore be different according to the degree of risque. The varieties of these risques depending on the greater or less chance of importing infection, have been sufficiently attended to by others. What I mean now to insist upon is, the greater or less chance of its taking effect when actually imported.

I have noticed, in the inclosed letter, the different degrees of susceptibility to epidemic diseases arising from the improvement of manners and the progress of civilization. Those only whose duty leads them to consider the subject, are aware how much the welfare of the human species depends on ventilation and cleanliness; and no one could render a greater service to his fellow-creatures, than to impress on their minds the necessity of cultivating them as moral and religious duties, or, at least, to inform the more enlightened part of mankind of the truth and great



importance of these facts. There is sufficient proof of them, both from ancient and modern history.

Though Egypt in modern times is considered as the constant abode and fountain, as it were, of pestilence, yet Herodotus [Euterp. 37.] observes, that its inhabitants, and those of Lybia, are the most healthy in the world, and remarks that they were eminently cleanly. It is observable, that that part of Hindostan which lies in the temperate zone, and therefore under that range of atmospheric heat which is favourable to the plague, has never yet been afflicted with it, in so far as we can learn from history, though a commercial intercourse is kept up with the Turkish dominions. This can only be ascribed to the great cleanliness prescribed by their religion.

The modes of life in England have undergone a complete revolution in this respect within the last two hundred years; and it is to this I have chiefly ascribed our long exemption from the plague. Holland affords a still stronger proof of this. The Dutch, in the period alluded to, have been not only the most commercial and the most cleanly people of Europe, but perhaps the most slovenly and careless with regard to the exclusion of pestilential infection; and yet they have not in that time been visited by the plague.

And it is farther worthy of remark, that they not only expose themselves to it, but their neighbours; for their cargoes brought from the Levant, consisting of certain raw materials very liable to harbour infection, are conveyed immediately to England, after undergoing, as I am credibly informed, certain precautionary processes, which are little better than empty forms.

There

There is another circumstance relating to susceptibility, which though it has not as yet, so far as I know, been considered as affecting the regulations of trade and quarantine, will, I apprehend, be found well worth attending to. It is invariably remarked in all countries liable to the plague, that there are certain seasons of the year in which the people are incapable of being epidemically affected by it. It has never *spread* in this country but in the months of July, August, September, and October, and has then spontaneously ceased as an epidemic. Now is it conceivable, that the trifling quantity of infection which may adhere to a bale of goods imported in the month of November, for example, can have any effect in exciting the plague, when the infection accumulated from thousands of sick persons, becomes at that time innocuous? Might not commerce, therefore, avail itself of this distinction of seasons, by making the importations from infected or suspected ports in the winter six months, thereby avoiding the risque of propagating disease, and diminishing the necessity of rigorous precautionary measures? During this season the principal object would be to dissipate any possible infection by airings, or to destroy it by fumigation, in order that it may not lurk till the return of the susceptible season.

The only other question of importance which I shall now touch upon is, whether lazarettoes ought to be afloat or on shore. The advantages of their being afloat are, 1st. That they are more airy than those on shore, of the most approved construction, which are surrounded by high double walls. The flux and reflux of the tide also produces some degree of salutary agitation of the air, and both their ports and upper works are constructed with lattice work for the free persilation of air. 2dly. That

That they are more easily guarded. 3dly. That they are less expensive. 4thly. That they are moveable; and 5thly. That they admit better of being multiplied.

The only objection I have heard to them is, that they are not sufficiently large. But those who make this objection, can hardly be aware of the extensive accommodations practicable in a large ship of war.

The expence attending the erection of the numerous lazarettoes that would be necessary, is, I apprehend, a solid objection against them; and it might hereafter be found, that they were not placed on the most commodious spots, whereas hulks are moveable. The Levant is not the only part of the world from whence the infection to be guarded against is imported; for about twenty-five years ago, a system of restrictive regulations was adopted with regard to ships from the ports of the Baltic, while the plague was in Russia and Poland.

It occurs to me that St. Mary's, Scilly, or Falmouth, would be the best places for the quarantine of the trade from the Levant; and Hull, Yarmouth, and the Isle of Grain, at the mouth of the Medway, for the trade from the Baltic. This last situation would probably be found more commodious than Standgate Creek, from its being an island, and more convenient for the port of London, from its adjoining to the Thames. The whole of the country on that part of the Medway is very damp, but this is rather a recommendation than an objection; for though damp air is unwholesome, this is partly owing to its greater \* attraction for noxious effluvia, whereby it carries it off sooner than dry air would. It is remarked

\* See page 261 of the preceding Work.

in Turkey, that one night's ventilation of goods in a foggy or damp air, is more effectual than a month of dry weather.

The only advantage that occurs to me of lazarettoes on shore over those afloat, is, that they afford a more agreeable retreat to passengers and others during their confinement. This is well worth attention, not only from considerations of humanity, but because every addition to personal hardship is an additional temptation to infringe the established rules. This advantage might easily be combined with the floating lazarettoes, by erecting some apartments on a small scale on the adjacent beach for the clothing and purification of such persons, and for their residence during the prescribed time.

But if these floating lazarettoes should not be considered as ultimately preferable, they certainly are unexceptionable as temporary succedaneums, more especially at this moment, when, from the political relations of the foreign powers, a great increase of the Turkey trade is rendered probable, and when every obstacle to it should be removed, in so far as is consistent with the public safety. And in case they should be found adequate to the purpose, I apprehend no intermediate quarantine would be necessary in the Mediterranean, such as is prescribed to be performed at Malta, Leghorn, or some other port in the Mediterranean or Adriatic; for this was intended by the legislature merely as a temporary regulation till lazarettoes should be built.

These are the remarks which have occurred to me since I saw you, and if you think them deserving of being communicated to the Turkey company, you are welcome



to do so. For farther information I beg to refer you to the work of Dr. Russell, who has deserved highly of the world, for the intrepidity, ingenuity, and industry he has displayed in his labours on this branch of his profession.

I am, with much respect,

Sir,



Your most obedient humble Servant.

GIL. BLANE.

## Q U E R I E S,

Submitted to Doctor JOHNSTON and Doctor BLANE, by the Turkey Company; with their Answers.

1st. ARE the vessels well adapted for airing cargoes, and can any improvements be made in their construction?

They are well adapted, but many improvements may be made both for shortening quarantine, and for more effectually purifying merchandize with foul bills.

2d. From the affidavits and testimonials with which we have furnished you, with regard to the manner of performing quarantine in Holland, do you conceive that it would be effectual in destroying infection if any adhered to goods imported?

We are of opinion that they would not be effectual.

3d. In case you think these nugatory or insufficient, can you account for the exemption of Holland and England from the plague for the last one hundred and thirty-three years, both these countries having been exposed to the unpurified cotton imported by the Dutch, who have no lazarettoes of any kind, and make little if any distinction between clean and foul bills?

We

We are inclined to ascribe the happy exemption of these countries from the pestilence, since the year 1665, to a want of susceptibility, arising from various improvements in the habits and arts of life. The great fire of London happened the year after the last plague, and the more spacious and airy manner in which the city was rebuilt, has no doubt contributed to its general salubrity, as well as the construction of common sewers about that time, or soon after, and the general reformation which took place in that age in the tastes and habits of the people, in consequence of the advancement of civilization and commerce, consisting chiefly in personal cleanliness and comfort, from the general use of soap and linen, the more ample supply of fuel, in consequence of the importation of coals by sea, and the more free use of vegetable food. It is a general remark in the history of all plagues, both in Asia and Europe, that they break out and prevail only among the lowest and poorest ranks of people, never becoming properly epidemic among the better sort. The general mass of the people are at present in possession of nearly the same comforts, and means of cleanliness, as the gentry two hundred years ago. The same reasoning will, we apprehend, apply to Holland.

4th. From your experience and success in destroying infection in the royal navy, do you know of any better method of destroying infection than by airing the articles suspected of containing it?

The method which we trust to in destroying the infection of malignant fevers, not only suspected, but certainly existing in the clothes of seamen, is by a fumigation with brimstone. It might have been added, "The putting of the infected clothes into a heated oven."

5th. The

5th. The law requiring that Levant goods, liable to retain infection, shall be sufficiently opened and aired in the lazarettoes of Malta, Leghorn, Ancona, Venice, Messina, or Marseilles (none of which are now accessible) are you of opinion that the same precautions as practised at Leghorn (the authenticated particulars of which are enclosed) which is the usual place where British ships perform their quarantine with foul bills, can be adopted with great safety to the public in the lazarettoes at Standgate Creek, and do you think the floating lazarettoes have any advantage over those on shore?

There can be no doubt, that if the same means are used respecting the purification of goods in England that are practised at the places specified in this quere, it might be done with equal safety to the public; and we are of opinion that floating lazarettoes, with the improvements that may be made in their construction and regulation, with some addition to their establishment, are preferable to any that can be built on shore.



IMPROVEMENTS proposed by Dr. JOHNSTON  
and Dr. BLANE, in the Construction and Regulations  
of the Lazarettoes in Standgate Creek.

THE principal improvements which occur to us, in  
the construction, would be,

- I. Either to slit and perforate the decks, so as to resemble the gratings forming the floors of the house, or to take up these decks, and construct gratings in the room of them.
- II. To cut ports in the side between the orlop and lower gun deck. Their length should be fore and aft, and close to the lower gun deck.
- III. The perfusion and change of air would be rendered still more complete, if an opening were made in the roof, surmounted with a moveable skreen, or vane, called a cowl; or with a turret, fitted with louvre boards, as a security against the weather.

With regard to regulations, in so far as these respect the detail of airing goods, we would recommend an imitation of those practised in the foreign lazarettoes, which have been found, by long experience, adequate to the purpose. These may be seen described by Mr. Howard, who performed quarantine himself at Venice, where the first lazaretto in Europe was established; and where the plague has never been since its first institution. We are, however, of opinion, with Mr. Howard, that the time might be abridged, particularly if the methods of destroying infection by fumigation should be adopted.

The

The regulations most urgently called for at present, on the supposition of ships without clean bills being admitted, are,

- I. To establish a floating infirmary. This should consist of a ship, moored near the lazarettoes, with one or more medical attendants, proper apartments, bedding, medicines, &c. arranged, on the supposition of the plague actually arising; the possibility of which should never be lost sight of. Even on the present footing of the lazarettoes it seems necessary, were it only as a matter of humanity towards the superintendents and labourers, who, we are told, at times experienced great hardship from severe illnesses, during which they had been cut off from all medical assistance; and in case of a fracture, or other severe injury, the hardship would be still greater.
- II. The next material alteration called for in the regulations, would be the repeal of that part of the act of parliament of 1754, whereby the superintendents are required, in case of the plague actually appearing, to communicate it to the privy council, and to wait for their directions. As the delay which this would occasion would be attended with the greatest inconvenience, cruelty, and danger, to individuals and the public, we are of opinion, that the superintendent should be authorized to act upon such an emergency, by instantly taking the proper steps for the separation and care of the sick.
- III. As guarding is of the utmost importance, we shall suggest some additional precautions and arrangements which will be absolutely necessary, in case of an increased risque, to the public health, and which may be practised in these floating institutions with superior advantage to those on shore.

We would recommend,

- I. That they should be surrounded with chains, attached to posts driven into the mud, or connected by means of buoys.
- II. That boats should row guard all night.
- III. That the boats belonging to the lazarettoes should, when not upon necessary duty, be always either on board, or fastened by chains, with strong padlocks; the keys of which should be in the custody of the master.
- IV. That centinels with loaded musquets, and with small pieces of ordnance, loaded with grape or cannister shot, should be constantly stationed on the most commanding parts of the lazarettoes.
- V. That no houses should be erected on the beach, nor near it.

Under these regulations, we apprehend that these lazarettoes will be less exposed to clandestine intercourse, whether from the anxiety of individuals to visit their friends, or for the purpose of illicit trade, than the lazarettoes on shore.

Office for Sick and Wounded Seamen,  
2d of May, 1799.

*Note.* A few weeks after this, a bill was brought into parliament, which passed into a law, entitled, "An Act to encourage the Trade into the Levant Seas, by providing a more convenient Mode of performing Quarantine, &c." whereby ships from Turkey with clean bills were exempted from performing quarantine in the Mediterranean, and the crown was enabled to establish proper regulations for the public safety in the ports of England. *not*

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